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1950

SERVICEWIDE MEETING
FIRE CONTROL, FIRE RESEARCH, AND SAFETY

OGDEN, UTAH
JANUARY 16 THROUGH JANUARY 20
1950

FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE

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UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

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and Refer to

WASHINGTON 25, D. C.

F(RF)
SUPERVISION
Meetings

May 12, 1950

K
SAFETY
Meetings

Regional Foresters
and Directors

Dear Sir:

Attached is a mimeographed report on the Ogden National Fire Meeting held January 16 through January 20, 1950.

The meeting was a joint Fire Administration, Fire Research, and Safety Meeting. The purpose was to give the personnel concerned with fire activity an opportunity to jointly discuss problems of mutual interest. It is felt that meetings of this type are of particular value in arriving at a unified objective in our varied fire control problems throughout the Nation. They give fire administrative officers and fire research men a better opportunity to understand each other's problems and objectives. Safety was given an important part in the meeting because fire men realize that a high percentage of accidents occur in connection with fire control work.

The material presented in this report has been separated into two parts:

1. The main body of the report:

   a. The topic assigned for discussion.

   b. The Committee recommendations.

   c. The Washington office comments.

2. The appendix:

   a. Notes on general discussion of the topic.

   b. Papers prepared and presented at the meeting.

The appendix material has been included because it gives a background on the topics for which committee reports were submitted. It also may have some value as a permanent record. Not everything quoted in the appendix has had W.O. approval. W.O. comments apply only to the Committee recommendations or other statements in Part 1 specifically referred to.

(Over)

6163

2-Regional Foresters and Directors-5/12/50

Distribution of the report to the field offices is being made as indicated below:

Very truly yours,

LYLE F. WATTS, Chief

By E. I. Kotok

6 copies to each region (1 copy should be delivered to the Division of Personnel Management)

3 copies to CAL, LS, NRM, NE, SE, and SS Stations (1 copy should be delivered to each person attending meeting)

2 copies all other Stations

Enclosure

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U. S. FOREST SERVICE

FIRE CONTROL-FIRE RESEARCH AND SAFETY MEETING

Ogden, Utah

January 16-20, 1950

ATTENDANCE

Regions		Washington Office	
Region	Name	Division	Name
1	Clayton S. Crocker	Fire Control	C. A. Gustafson
	Clyde D. Blake	Fire Control	Ira C. Funk
2	W. S. Davis	Fire Research	A. A. Brown
3	D. W. Beck	Personnel Mgmt.	Seth Jackson
4	Floyd W. Godden	Experiment Stas.	
	James M. Hockaday		
	J. W. Mattsson	NRM	Chas. L. Tebbe
	H. E. Hedges		J. S. Barrows
	Lester Moncrief		
		SS	David Bruce
5	Frank J. Jefferson		
	George M. Gowen	CAL	C. C. Buck
	V. A. Parker		
		PNW	A. G. Morris
6	K. W. Linstedt		G. L. Hayes
	M. M. Nelson		
	John Bowen	LS	J. A. Mitchell
7	E. M. Olliver	SE	R. M. Nelson
8	A. W. Hartman	Other Agencies	
9	J. M. Valley	Howard Beehler, Fire Control Officer, Bureau of Land Management, Salt Lake City, Utah	
		L. F. Cook, Assistant Chief Forester, National Park Service, Washington, D.C.	

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COMMITTEE ASSIGNMENTS

ADMINISTRATION

TOPIC

1. Correlation of Functional Administrative Policies.
   Crocker Ch., - Hartman - Beck

2. Our FF Bill and What we can Do about it.
   Godden Ch. - Jefferson - Walley

3. Aerial Fire Control.
   Jefferson Ch. - Barrows - Crocker - Funk

4. Equipment Standardization.
   Linstedt Ch. - Funk - Davis

5. Equipment Development.
   Hartman Ch. - Funk - Buck

6. Overhead Training.
   Davis Ch. - Walley - Linstedt

7. Initial Action Trends.
   Beck Ch. - Mitchell - Gowen

8. Prescribed Burning.
   Hartman Ch. - Bruce - Godden

9. Financing the Increasing Protection Problem.
   Linstedt Ch. - Olliver - Jefferson

10. Use of Cooperators.
    Olliver Ch. - Walley - Crocker

RESEARCH

11. Fire Behavior and How to Improve our Knowledge of What to Expect.
    Buck, Jefferson) Co-Ch. - Godden - Barrows

12. Role of Fire Research.
    Mitchell Ch. - Jefferson - Beck

13. Fire Research Finances.
    Buck Ch. - Nelson - Barrows

TOPIC

14. Analysis of Fire Experiences as a Criterion to Well-balanced Fire Control Systems.
Barrows Ch. - Mitchell - Morris

15. Fire Damage Appraisal in California.
Buck Ch. - Bruce - Crocker

16. Fire Weather Forecasts - Use and Accuracy in Connection with Fire Danger Ratings.
Morris Ch. - Mitchell - Nelson

17. Aerial Detection Problems.
Morris Ch. - Crocker - Gowen

18. Danger Rating Systems.
Hayes Ch. - Buck - Davis - Nelson

SAFETY

19. Safety in Fire Suppression.
Jefferson Ch. - Linstedt - Parker

TOPIC 1. CORRELATION OF FUNCTIONAL ADMINISTRATIVE POLICIES.

What can be done to correlate functional administrative policies which are now pulling apart to the detriment of fire protection? As an example, cited is the cost reduction philosophy of brush disposal, blister rust control and engineering project work which dictates a program of contract rather than force account projects. This seriously reduces fire control strength and if continued in this direction, a possible end could be the elimination of the availability of efficient organized crews for fire suppression work.

COMMITTEE RECOMMENDATIONS

Fire Control is recognized by this Committee as a functional service responsible for providing that level of protection essential to best over-all forest land management.

The facilities specifically provided for fire control administration with which to accomplish the objectives currently required by the operation of land management activities are inadequate.

Hence, it has been necessary through the years to supplement primary fire control resources with assistance from other functional branches in meeting fire over-loads.

Through a unity of purpose and a maximum correlation of effort a reasonably acceptable protection job has been accomplished. Continuation of this integrated effort is essential to future assurance of satisfactory protection in the absence of vastly increased special fire funds and facilities.

Administrators of the fire control function are apprehensive of certain apparent trends which indicate a depreciation of that correlation of purpose and effort. Material damage has not yet resulted from this trend, but the potential impact of a break-down could prove serious. Separation, a pulling apart of organization components, is indicated by the uncorrelated programs initiated by functional divisions which in the end result in a weakened fire control structure.

Illustrative of this situation is the action by Timber Management in contracting of brush disposal and blister-rust control work. This action reduces the number of men available for fire duty. It shrinks the opportunity for organizing, training, and developing qualified fire fighters. It removes a considerable number of men from those tight administrative controls essential to effective fire management.

Likewise, Engineering is progressively increasing the portion of its work under contract. This reduction in force account program reduces the manpower potential for fire duty.

Watershed Management advocates retention on the ground of debris and organic materials which constitute an increase in hazard and cost of protection.

Certain silvical practices adopted to benefit regeneration and for other considerations often greatly increase the difficulty and cost of fire protection.

Concurrent with this increase in the fire job load and a lowering of available assistance there is a consistent urge for reduction of fire-protection costs.

This situation places Fire Control Administration in a position where it must either receive increases in facilities commensurate with the expanding job load or it must accept a lowering of protection level.

As a matter of good business and sound land management Fire Control opposes both these possible solutions. Fire Control believes that correction of the situation is possible through a better correlation of functional activities.

To that end, we recommend that a common effort be made to effect a degree of activity correlation which will assure a unified approach in our attempt to meet land management objectives.

Signed: C. S. Crocker, Chairman
D. W. Beck
A. W. Hartman

WASHINGTON OFFICE COMMENTS

It is recognized that certain resource management practices and other activities may result in an increase in the fire hazard or an intensification of risk, and make fire control more difficult.

Regional Foresters should give this matter attention to determine the effect on fire control of other activities and the extent to which correlation is needed. This is a subject that requires continuous study as our resource management becomes more intensive. Undoubtedly, there will be need in many cases to strengthen fire control to keep pace with essential resource management practices.

TOPIC 2. OUR FF BILL AND WHAT WE CAN DO ABOUT IT.

The FF bill is becoming greater each year; this is in spite of the fact that over wide areas we have not been experiencing unduly difficult fire seasons. This fiscal year for the first time FF expenditures will be about $7,000,000. Our responsibility to the tax paying public to hold such expenditures to a minimum, and our responsibility to our job as Fire Control Management administrators dictates the need for frank discussion of this perplexing topic.

COMMITTEE RECOMMENDATIONS.

Your committee is mindful of the increased demands imposed upon FF during the post war years brought about by:

1. An increase in wage rates of approximately 162% over pre war rates.

2. An increase of other commodity prices of approximately 59%.

3. Added costs of complying with the 40-hour week and overtime.

4. Added fire business brought about by greatly increased utilization of our forests adding to both risk and hazard.

The above increases are brought about by events over which we have little or no control so that any reductions in total FF that we can make must come through better management of our fire business. We recommend a detailed review of our fire practices looking to improved management with special emphasis directed to the following:

1. Intensify local fire prevention effort to accomplish the maximum in reducing man-caused fires by pin pointing our effort to the most critical risk and hazard areas.

2. Stress selective mobilization of the most efficient suppression forces, followed by rigorous screening, efficient organization, and direction by our most competent overhead in conformity with a sound suppression plan. Avoid mass manning in numbers beyond those which we can efficiently supply and supervise.

3. Improve our methods in use of machinery by training operators, and other overhead in their proper and most efficient use and integrate this machinery use closely with that of hand forces to get maximum balanced production.

4. Study manning practices with a view of strengthening initial attack forces for those potentially critical fires which by their location or nature hold promise of getting away. We recommend the use of more well trained "hot shot" type crews which have proven so valuable where used.

5. Study critically by financial reviews our fire fiscal practices looking towards improving our purchasing procedures and fire wage structures, elimination of overtime, etc., so as to assure efficiency with our FF dollars.

Signed: F. W. Godden, Chairman
F. J. Jefferson
J. M. Malley

WASHINGTON OFFICE COMMENT

Better management of our fire business practices surely is the key to reduced FF expenditures.

The committee recommendations involving pin-pointed prevention, selective mobilization, screening, organization, leadership, methods, and manning practices are surely important components of the financial management job.

"Better Management" includes of course constantly searching for and using new and improved methods and equipment as discussed in other sections of this report.

Also important as a tool to gain recognition of sound fire fiscal practices are financial boards of review.

One important point which was discussed but not made a part of the committee recommendations involved the elementary mistakes being made by our fire personnel, resulting in high suppression costs and heavy damage during 1949 and previous years. The elimination of such mistakes is so important that it must require serious attention by all fire management personnel.

Committee recommendations approved.

TOPIC 3. AERIAL FIRE CONTROL.

Aerial fire control activities are growing rapidly - helicopter use is expanding. Important cross roads are being reached in the transition from certain ground activities to aerial uses. How can adequate checks and balances be established to avoid too rapid changeovers or lags in sound development of this expanding activity.

(a) COMMITTEE RECOMMENDATIONS

1. During the past several years a great increase in the use and appreciation of the possibilities of fixed wing aircraft has brought about radical changes in fire control plans and in some cases has eliminated ground facilities to such an extent that any future retreat from the use of the air plane is not possible. Further expansion

of the use of fixed wing aircraft must be supported through a comprehensive analysis of the experience to date. Based upon this analysis, basic principles and techniques should be developed for planning coordinated air-ground control units. Decision as to future expansion should then be based on systematic planning methods comparable to those formerly used in the design of ground forces. Aggressive development under these principles is warranted.

Further investigative work in the uses of the helicopter should be encouraged and its potentials as an aid to the fire boss, the line bosses, and its utility in distributions of men and supplies thoroughly explored. Evidence to date is that it may revolutionize many existing practices based upon ground or fixed wing transport facilities. If an area with sufficient fire occurrence can be identified, it might be desirable to establish a parallel operation to the smokejumper project. The possibility of this should be studied further.

More attention should be given to training of observers and pilots in aerial reconnaissance. In this field it should be fully recognized that the skills of the pilot and observer are the criteria of successful results. The craft is simply a means of transport. A flight without properly skilled personnel is a wasted effort, and generally results in misleading information.

A thorough study should be made this year (1950) of the possibilities of establishing an aerial shock troop system to cover the six western regions. This would involve placement of trained shock units of from 50 to 100 men at strategic heavy transport plane bases throughout the West. Then planned transport to subsidiary bases in the regions and disposal from there by light plane or helicopter to work bases. Success of local "hot shot" crews to date indicates the potentialities of such an undertaking. (See Appendix Topic 3). As a prelude there should be careful study of fire occurrence data in the regions involved, availability of aerial transports, the organizational set-up necessary to run such an operation, and cost calculations. Results of established "hot shot" operations should be a part of the analysis. It is further recommended that the Chief's Office explore with Army and Air Force the possibility of using soldiers and Army air transportation to implement such a plan.

Signed: Frank J. Jefferson, Chairman
Ira C. Funk
C. S. Crocker
J. S. Barrows

WASHINGTON OFFICE COMMENT

1. Expansion of aerial activities. Decision as to future expansion must be based on systematic objective planning methods comparable to those formerly used in the design of ground forces. Once such plans are developed and it is shown that there is economic justification for supplementing or replacing ground forces such plans with regional recommendations will be submitted to the W.O. for review and approval prior to making the change.

2. Helicopter for initial attack. The next phase in the use of the helicopter should probably involve a selection of a large area where fire occurrence is high and the possibilities of spot landings exist, and to undertake trying out the helicopter in initial attack on a large scale. Studies with this objective in view will be made in the near future.

3. Aerial Shock Troops. There is much appeal to the proposal. However before decision can be made a study must be undertaken, as the committee recommends, to determine the merits of the proposal.

The first step in such a study has been initiated but before it is completed help from the regions will probably be necessary. Objective treatment of the proposal is highly important.

The question of armed force participation will also be investigated.

The committee recommendations are otherwise approved.

TOPIC 3 (b). Subsequent to the Ogden meetin the committee selected to work on the Aerial Operations Handbook met in Missoula. From their discussions developed a set of recommendations which is so closely related to Topic 3 of the Ogden meeting, that it is included under this topic.

COMMITTEE RECOMMENDATIONS AS TO CONTROLLING POLICIES IN AERIAL FIRE CONTROL TO BE INCLUDED IN CHAPTER A, OF THE NATIONAL FOREST MANUAL.

General: Aerial fire control activities, both by fixed-wing aircraft and helicopters, have grown rapidly, with strong likelihood of further expansion. There have been substantial substitutions of performance by air in certain activities previously accomplished only by ground methods. Adequate checks and balances must be established if too rapid change-overs or lags in justifiable transitions are to be avoided.

Administration:

1. During recent years a growing appreciation of the possibilities of fixed-wing aircraft has brought about a great increase in use with resultant radical changes in fire control plans. In some cases ground facilities have been eliminated to such an extent that retreat from the airplane is not possible except at a tremendous cost for restoration of the presently eliminated ground facilities. All proposals for further expansion in the use of fixed-wing aircraft must be predicated upon careful cost-versus-benefit studies, based upon comprehensive analysis of experience to date. Based upon this analysis, basic principles and techniques should be developed for planning coordinated air-ground control units comparable to those formerly used in the design of plans for placement and operation of ground forces. Aggressive development of additional air-ground

control units is warranted for those areas where application of these planning methods and experience analyses show a substantially favorable cost-benefit ratio.

2. The use of the helicopter should be encouraged and its potentials as an aid to the fire boss, the line boss, and its utility in distribution of men, equipment, and supplies should be thoroughly explored. Evidence to date is that it has possibilities that may revolutionize many existing practices based upon ground or fixed-wing transport. Here, also, use must be justified by a favorable cost-benefit ratio in terms of increased efficiency and safety of overhead and line workers and reduced cost of encompassing and holding of fires.

3. The wasted effort, misleading information and unproductive expense that generally results from reconnaissance and scouting flights without properly skilled personnel must be avoided. Adequate attention should be given to the training of pilots and men used as observers in aerial reconnaissance. In this field it should be fully recognized that the skills of the pilot and observer are the criteria of successful results. The craft is simply a means of transport.

4. An Aerial Operations Handbook is being developed to be used as a controlling guide and aid to adequate administration of aerial activities. This handbook must be kept currently revised and set forth the best available knowledge in the fields of:

a. Personnel qualifications essential to adequate performance of the jobs to be done.

b. Training methods for the various types of jobs, including adequate training in safety practices.

c. Indices as to the minimum performance requirements and other essential features of various types of fixed-wing aircraft and helicopters that are required to carry out safely each of the many sorts of service required in fire control operations.

d. Operating rules aimed to produce efficient and safe action.

e. Techniques of operation including safe practices and mechanical safeguards.

5. Strict compliance with all provisions of pertinent Civil Air Regulations and with Forest Service air rules is mandatory except as follows:

a. Where waivers have been obtained from CAA authorizing specific deviation from its standard practice regulations.

b. Where military personnel and equipment are used which operates under its own regulations. In such cases care should be taken to assure that the qualifications of both personnel and equipment used are equivalent to the minimum standards required by the Forest Service for civilian operators.

6. Design and maintenance of smokejumping equipment is so important to personnel safety and job efficiency that centralized control is mandatory. The responsibility for maintaining this control has been given to Region One. In order to redeem this responsibility, Region One will designate a qualified member of their aerial fire control staff to inspect smokejumper units in all regions. Since this inspector will be functioning at the Washington level, he should be accompanied to the smokejumper unit by a representative of the Regional Office where the unit is located. The inspector will prepare a memorandum of inspection and furnish a copy to the regions concerned and the Chief's Office.

7. Use of airplanes to transport pickup fire fighters should be done only during extreme emergencies and when stakes are high or when actual saving in cost is effected.

Use of aircraft for luxury-type service must be avoided; it's easy to drift into the habit of not calculating the cost when air jobs are scheduled. Avoidable use of aircraft for overhead transportation, resulting from failure of a receiving forest to calculate its needs in time, is an example.

8. The interregional exchange of use of air personnel, including smokejumpers, and equipment, is encouraged.

9. Public Demonstrations: The following policy governing public demonstrations involving smokejumping and cargo dropping is established:

Public demonstrations of smokejumping and cargo dropping work will be disapproved by the regional forester, except in those few cases where the regional forester believes there is some very unusual Service benefit involved. In such cases the request, with the regional forester's recommendation will be submitted to the Chief for his study and approval prior to initiation of the demonstrations.

10. Aerial Hazards: It is the policy to encourage power and telephone line builders to the fullest degree to make selection of safe locations for these lines. Avoid the practice of crossing lakes, rivers or valleys with long, high strung spans that are dangerous to air traffic. Safe location practice is mandatory for Forest Service construction. In cases where such lines exist, an arrangement should be made to have the towers at both ends of the span marked by standard CAA hazard markers as fully as practicable.

It should be standard practice on all forests to prepare maps showing all such air hazards and to provide not only Forest Service pilots, but all pilots engaged by the Forest Service, with them.

11. Signal and Identification Markings: It will be standard practice to use CAA signals and identification markings. No special Forest Service device should be developed to serve a need that can be filled by a standard CAA symbol.

12. No equipment or material shall be used in aerial activities that has been classified or disposed of by any agency as being unfitted for its own use for purposes identical with those proposed by the Forest Service. This does not preclude the salvage of durable materials for use in manufacturing equipment.

Use of Continental Air Command Resources: Current local liaison between regions and Continental Air Command headquarters, and air base commanders is extremely important. Requests for aid are to be made only after all Forest Service-owned, chartered or contractable facilities available within time limits are exhausted and then only through the Forest Service representative designated as liaison officer for the base to which the request is being directed.

Signed: Frank J. Jefferson, Chairman
Clayton S. Crocker
Jamoson Hockaday
L. L. Colvill

WASHINGTON OFFICE COMMENT

The above general aerial fire control policy statement has been considered and rewritten for inclusion in the Manual.

TOPIC 4. EQUIPMENT STANDARDIZATION.

Over the years a great deal of effort and money has gone into tank-truck design. Some regions started out with fan belt drive pumps - graduated to power take-off, then to independent power units. Is the design of tank-trucks sufficiently advanced to select certain models as standard? There may be other items of equipment and structure such as look-outs that should be discussed from the viewpoint of standardization. Topic leader and group should feel free to include any other items of equipment they wish.

COMMITTEE RECOMMENDATIONS

The following subjects were discussed during the conference and your committee recommends the following action in connection with the standardization of equipment:

1. Standards should not be so restrictive as to impair progress.

2. Specifications must be kept current to be useful.

3. Before a specification is set up thorough surveys must be made of:

   A. Field needs
   B. Availability in the open market

4. Standardization should be thoroughly justified on the basis of:

   A. Economic gains through incentive for commercial manufacture because of quantity purchased.

   B. Reduction in training requirements.

   C. Simplification of repair parts and problems.

5. Adoption of an item as standard should be considered individually and fully on its own merits.

6. Full consideration on the establishment of an item as standard should be given multi-purpose aspects providing the item remains adequate for the primary purpose originally intended.

7. Safety provisions should be included in all items covered by standard specifications.

8. Standard specifications should cover basic components without frills allowing optional choice of other components and accessories to meet varying local needs; i.e., proposed standard slip-on tankers. Optional features should include pumper-engine unit, hose, tools, etc.

9. Current trends in the development of standard specification for slip-on tankers, lookout cabs, and towers received general acceptance of the group.

Signed: Kermit L. Linstedt, Chairman
Ira C. Funk
Wilfred S. Davis

WASHINGTON OFFICE COMMENT

Recommendations approved.

TOPIC 5. EQUIPMENT DEVELOPMENT

To date advances have been made in the equipment development field, such as smokejumping, cargo dropping, helicopter use and the application of the tractor drawn plow to the fire line construction job. Is progress in this field as rapid as we should expect? What should be done to make this phase of our work more productive? Should we abandon work looking towards the development of equipment of facility and devote all our energy in this field looking towards the development and application of equipment of necessity such as mechanized fire line construction equipment, aerial equipment, extinguishing agents, etc? What about centralization of such work?

COMMITTEE RECOMMENDATIONS

The consensus of important viewpoints and desires brought out during subject discussion were:

1. Determination and selection of equipment items to be developed cannot be approached advantageously from the standpoints of necessity and facility.

We recommend the approach be:

a. Methodical search for and identification of fire control bottlenecks, through widespread consultations with fire bosses, or equal, who know their problems.

b. Screening the inventory of bottlenecks and establishing relative priorities through economic analysis.

c. Concentrating planned effort on those bottleneck items offering the most applicable and balanced potential returns from risk of available development funds.

2. Once an item is attacked effort should be sustained until acceptable solution, obsolescence, or obvious failure.

3. New projects to be selected from up-to-date priority inventory as funds become available.

4. When an item is developed, or an equipment unit of potentially wide application appears, we recommend that it be brought to the direct attention of administrative field men by means of a special traveling task force made up of individuals particularly qualified to demonstrate the characteristics and possible uses of the item in skilled hands.

5. The Committee does not believe that the question of centralized equipment development lends itself to a generalized answer. We recommend that decisions on centralized equipment development be the end result of analysis of problems and after proper assessment of the possible contribution by industrial laboratories, technical colleges, and similar competent sources.

6. Particularly complex equipment development problems require a wide variety of specially qualified personnel. Often such personnel is not available at a single location or at the best place to conduct the project.

It is recommended that such personnel be made available as needed on these projects, especially for planning, coordinating, and evaluating the results obtained.

Signed: A. W. Hartman
C. C. Buck
Ira C. Funk

WASHINGTON OFFICE COMMENTS

To the above should be added the following:

In order to guide equipment developers, certain specific objectives should be set up before actual development work is started. They follow:

1. A detailed study should be made to make sure that the item of equipment considered for development will "pay its way." In other words before an item of equipment is approved for development studies must show (a) that its operation, maintenance and replacement costs will not be more expensive, including damage, than fighting fires by conventional methods and (b) that it is the most effective known piece of equipment that can be developed for the purpose intended.

2. Specific determination of the job or jobs to be done by the equipment in all areas where it will be applicable, the conditions under which it is to be worked, the essential features and performance, and the desirable but nonessential features and performance.

Recommendations approved.

TOPIC 6. OVERHEAD TRAINING, INTRA- AND INTER-FOREST AND REGION

What were our experiences in the advancement of the overhead training concept as outlined by the Chief early in 1949? What more needs to be done to make this an effective tool in raising the level of the "know how" of men we depend on to handle our many fire suppression jobs?

COMMITTEE RECOMMENDATIONS

The experiences of the six western regions in the application of the overhead training concept as outlined by the Chief early in 1949 have on the whole been satisfactory during the first year. All regions entered into the interregional program and, in addition, carried on within its own boundaries inter-forest training on suitable fires.

The committee makes the following recommendations:

1. That the interregional and interforest training program be continued.

2. That Region 5 assume responsibility for handling the program's central dispatching duties in 1950, followed by Region 4 in 1951.

3. That trainees be sent by Government or chartered plane whenever possible in order to speed arrival.

4. That when 3 or more men are sent, one of them will be a trainer.

5. That Region 9 be included in the program.

6. That the National Park Service and Bureau of Land Management be invited by the respective regions to be included in the interforest part of their program.

7. That fire research and equipment development men should be considered when making up trainee groups for going fires.

8. That each region be encouraged to send groups of trainees to neighboring regions for extended assignments during periods when high fire occurrence is normally expected.

Signed: Wilfred S. Davis, Chairman
K. W. Linstedt
J. M. Talley

WASHINGTON OFFICE COMMENTS

A circular appointing Region 5 as the dispatching agency for interregional movements of men for western training assignments on going fires has been issued. This circular also approved inclusion of Fire Research personnel on the same basis as NFA men. Also approved was the participation of National Park Service, the Bureau of Land Management personnel and Region 9 in this training program.

Real impetus can be given this training program if each region will intensively plan and carry out intra-regional training of fire overhead as the opportunity affords and if they will watch closely the fire situation in other western regions so they can be in position to move rapidly when the opportunity is presented.

It is expected that Region 5 will aggressively organize, plan and implement the dispatching phases of the western region interregional fire overhead training program.

In line with these comments the committee recommendations are approved.

TOPIC 7. INITIAL ACTION TRENDS.

Each Region has been furnished the results of a statistical study relating to initial action trends on fires. Do we need to give new attention to improving initial action performance in our fire control job? What are some of the things that may be done?

COMMITTEE RECOMMENDATIONS

As a result of group discussion on the subject of initial action trends in fire suppression the committee offers the following observations and recommendations:

Observations

1. In some instances there appears to be a definite lack of attention on the part of administrative personnel with respect to initial attack phases of suppression action.

2. Former time standards require reappraisal due to changing conditions, such as:

a. Change in transportation methods
b. Fuel types
c. New techniques and facilities

3. We do not have the former experienced personnel in subranger positions responsible for initial attack action which were available in prewar days.

4. It is evident that many large fires are caused by initial attack failures due to lack of adequate training, proper instruction, and adequate follow-up inspection.

5. Better provision for competent reinforcement is essential to effective initial action in many areas.

6. Increased emphasis on other activities and a decreased number of large and disastrous fires have resulted in decreased attention on the part of supervisory personnel to insure adequate initial action on fire suppression.

Recommendations

1. As a first priority, all personnel responsible for supervision of action involving initial attack be given systematic instructions and training.

2. Regions should be supplied initial attack data from card runs by the Chief at 5-year intervals. These will serve as a check on forest performance.

3. That the appointment of district rangers, ranger alternates, or fire control assistants be limited to men who have been provided with an acceptable standard of fire control experience.

4. That existing time standards involving initial attack, including reinforcement, be reappraised and adjusted to meet the needs of changing conditions.

Signed: Donald [illegible]. Beck, Chairman
George M. Gowen
J. A. Mitchell

WASHINGTON OFFICE COMMENTS

The statement in the committee report "In some instances there appears to be a definite lack of attention on the part of administrative personnel with respect to initial attack phases of suppression action" is a pretty serious condemnation of personnel responsible for initial attack in those areas where this statement applies. Recognition of the existence of this situation forces the need to work towards elimination of this "lack of attention to initial action phases of suppression action." Surely we must insist that everything reasonable be done to correct these weaknesses where they exist.

If increased emphasis on other activities has, as stated, resulted in decreased attention to the initial action phases of fire control, this trend must be corrected.

TOPIC 8. PRESCRIBED BURNING AS PRACTICED IN REGION 8.

Presentation of methods used in Region 8 including conditions called for this practice and planning for it.

No formal paper was presented on this subject. A description of the purposes, techniques, and results of prescribed burning in Region 8 was given by Messrs. Hartman and Bruce.

The following is the extent of Region 8's prescribed burning:

	Year	Acres burned	Cost per acre
Winter	1943-44	143,000	.11
	1944-45	180,000	.10
	1945-46	155,000	.12
	1946-47	110,000	.15
	1947-48	216,000	.15
	1948-49	186,000	.17

No committee report.

WASHINGTON OFFICE COMMENTS

None

TOPIC 9. FINANCING THE INCREASING PROTECTION PROBLEM AND GETTING THE MOST USE OUT OF THE SCARCE POST FIRE DOLLAR.

The protection problem is increasing and in the face of lowering of the purchasing power of the dollar, with no real hope for increased financing, the protection job is becoming more and more difficult. What can be done to get the most out of the protection dollar?

COMMITTEE RECOMMENDATIONS

Group discussions pointed up clearly the decline in the purchasing power of available P&R fire funds. This coupled with the increased risk and hazard in many forest regions poses a difficult problem in meeting protection needs.

This situation prompts the following recommendations by your committee:

1. The divisions of Operation and Fire Control in both the regions and in Washington should carefully check diversions of P&R fire funds to other activities. In the regions expenditures should be so budgeted as to provide a maximum number of fire goers without slighting good organization practices.

2. More positive action should be taken by the regions and Washington to make known the needs for additional P&R fire funds. This action is needed both within and outside our organization.

3. Standards of protection needed should be based on acceptable losses by localized management units and should reflect insurance rates necessary to cover such losses and reduce them to an acceptable standard when considered in light of total values involved.

4. Greater emphasis of protection activities by all unit managers to overcome the complacency developed by the pressure of other activities and a series of less than average fire years.

5. All unit managers should aggressively work for known better management practices including training, recruiting, use of protection crews on project work during favorable weather periods, planning, and the minimizing of overtime payments.

6. We recognize the practice of drawing on FF for other than bonafide emergencies as unsound financing.

7. A trend towards the delegation of responsibility for the fire control activity to subordinates without adequate check to assure acceptance of that responsibility should be stopped.

8. Additional effort should be expended by regions to assure that payment for protection of private, State and Federal cooperators' lands are in line with our costs of doing the job.

Signed: K. A. Linstedt, Chairman
Frank J. Jefferson
Ephem Olliver

WASHINGTON OFFICE COMMENTS

Item 1. Job load analyses and other criteria have shown the extent of services by other than Unit Management and strictly project personnel and facilities to the fire function. These services are calculated to amount to slightly more than $1,000,000 based on current cost indexes. This amount is withdrawn from the over-all Fire Control appropriation and added to the Base. During the current fiscal year $981,000 of this amount was allotted to the regions. The remainder was used here to finance the Division of Fire Control and a portion of the National Prevention program being handled by Mr. Davis of the Division of I&E. Hence there has been no diversion of P&M Seasonal Force funds to other activities at the Washington Office level.

Also it is not fully correct to State that P&M Seasonal Force funds are diverted to other activities within regions. The question is more in the nature of the priorities observed in the use of such funds. Considerable amounts of P&M Seasonal Force funds are used for (1) maintenance and replacement of lookout and fireman structures (2) aerial mapping, (3) financing salaries of supervisor fire staff officers (4) assistant rangers salaries (5) post- and pre-season employment of short-term personnel, (6) yearlong fire control assistants, (7) heavy equipment purchases, etc. These are not strictly diversions of Seasonal Force P&M funds.

However, use of Seasonal Force funds for such purposes does reduce the amount of funds available (unless FF is used) to employ lookouts and other strictly initial action personnel. A direct measure of whether or not P&M Seasonal Force funds should be used to finance these activities involving primarily the non-initial attack phases of the fire control activity is the extent these regional priorities in the use of Seasonal Force funds reduces the level of protection below that planned, or increases the impact on the amount of FF used for prevention and presuppression (also suppression) for the current year.

There is no question here but that regional budgeting of P&M Seasonal Force allotments has not in all instances weighed the impact on the current year's expenditures of FF. Some consideration here has been directed towards ways and means of getting a heavier percentage of P&M fire funds devoted to the initial action phases of fire control. Guard month quotas and other means have been discussed. Each would have the bad effect of reducing the opportunity for good financial management at the regional level which we do not wish to disturb.

Regional Foresters should make certain that Seasonal Force P&M funds are budgeted in such a way that demands on FF for prevention and presuppression do not result.

Item 2. Agree.

Item 3. Agree in principle. However when making plans for low value areas, full consideration must be given to the possibility of fires originating on such areas spreading to areas of higher values.

Item 4. Agree.

Item 5. Agree.

Item 6. Agree. - The policy on the Use of FF precludes use of FF except for bona fide emergencies.

Item 7. This is a serious matter and we are glad to note fire managers are in agreement that this trend should be reversed.

Item 8. This is a very important matter and we are in full agreement with the recommendations.

TOPIC 10. USE OF COOPERATORS TO INCREASE STRENGTH OF INITIAL ACTION ON FIRES

Presentation of Cooperator Arrangements in Region 7, where all attack is by prearranged cooperators.

No formal committee report was prepared. Topic presented to illustrate what Region 7 has been able to accomplish with a highly organized cooperator organization.

WASHINGTON OFFICE COMMENT

Aggressive attention should be directed to exploring the possibilities of strengthening the fire organization with the use of more cooperators for initial attack purposes.

RESEARCH SECTION

TOPIC 11. FIRE BEHAVIOR AND HOW TO IMPROVE OUR KNOWLEDGE OF WHAT TO EXPECT.

The best economics and maximum social benefits to result from national forest fire control management can be realized only through application of procedures based on the most modern, up-to-date scientific method.

To the accomplishment of this end it is evident to this group that there is a mutual responsibility of fire control administration and fire research. The determination of basic principles of fire behavior and the accumulation of essential facts is the recognized role of fire research. Because of the complexity of the behavior problem and the basic role behavior knowledge must play in adequate suppression action, research and administration must join in putting the results of research to effective use.

COMMITTEE RECOMMENDATIONS.

Your committee recommends that through such joint effort:

1. The known fundamental principles of fire behavior be provided within the year to the end that fire control officers at all levels may execute better suppression planning and action programs, better execution of fire use, and to insure the maximum safety of the general public and of fire line workers.

2. Illustrative examples of combinations of conditions that lead to potential blow-ups be made available currently as these combinations of conditions can be recognized and evaluated.

3. Fire research attempt to draw up a standard form or check list of known elements that affect the behavior of large fires to provide fire control officers with:

   (a) A systematic method for evaluating current burning conditions.

   (b) A form on which to record observational data on large fires to be later codified.

4. An adequate program of fire behavior research be aggressively pursued to establish the facts and relationships that are still in the realm of the unknown.

5. Research with the help of administration embark upon an aggressive program to obtain federal, state and other cooperative funds needed for a comprehensive program of forest fire behavior research.

Signed: C. C. Buck, Co-Chairman
Frank J. Jefferson, Co-Chairman
J. S. Barrows
F. W. Godden

WASHINGTON OFFICE COMMENTS.

A thorough understanding of fire behavior by every responsible fire man must come close to being the number one prerequisite to competent fire fighting by the Forest Service. Certainly it is the prerequisite to working men safely on the fire line. For that reason we very much commend the committee proposals that definite action be taken to make sure that the best we know is made available to every fire man. This calls for a project job of teamwork in every region. We need to reconstruct and to reanalyze as many as possible of the blowup fire situations in each region that are dangerous to men, in order to clarify how to recognize such situations more promptly, and in order to specify the corresponding measures to take, both in the interest of better fire strategy and of better safety to the men engaged.

We will want to participate with you in this process through the Divisions of Fire Control, Fire Research, and Personnel in order to correlate the findings and to codify the over-all measures that are of general application. I hope definite progress on such a project will be made during the coming year as the committee recommends.

TOPIC 12. ROLE OF FIRE RESEARCH.

Many perplexing problems exist in every station where fire research is carried on, in deciding what allocation of time and resources will contribute the most to improving fire control in the long run. The conflict in part is between staff and service jobs at the expense of approved projects. What service to administative men it is reasonable to expect as the research staff is increased needs to be examined from the job load point of view.

TOPIC 13. FIRE RESEARCH FINANCE.

The time and opportunity for fire men in the administrative organization to carry out worth-while investigative projects seem to keep on reducing, compared to the situation 20 years ago. At the same time, fire research is now financed to a level that is hardly adequate to carry on the more fundamental and highly technical phases of the job. How to take care of current demands and how to keep longer term projects producing results, pose financial problems in every fire research program.

Topics 12 and 13 were closely related and discussion was not separate. They are presented as one topic.

COMMITTEE RECOMMENDATIONS - Topic 12:

It must be recognized that the research job breaks down into three major parts, basic research, projects of value to administration where results may be obtained in a short time, and the

job of insuring that administration has available all of the information secured through research, with recommendations for applied use.

It is recommended that basic research be carried along at a consistent level required for long-time projects. The major portion of the effort, however, should be directed toward completing projects of immediate value to fire administration, with an appropriate share of this effort placed on assisting administration in selling available information and its use.

Signed: J. A. Mitchell, Chairman
Frank J. Jefferson
C. C. Buck

COMMITTEE RECOMMENDATIONS - Topic 13:

The Division of Fire Research should make a careful review of its program in the light of suggestions and criticisms offered at the Ogden conference, as one means of assuring that available research funds are being put to their highest use.

Beyond this it should be recognized that financing of the fire research activity is far out of line with needs and opportunities. In respect to the size and complexity of the job to do, the number of men employed, and dollars spent, the Division of Fire Control is easily the equal of any other resource management division. But it is doing its job, or trying to do it without benefit of anywhere near the amount of research assistance afforded other divisions. This is apparent from the number of men financed (10), the dollars available (123,000), the percentage of the total research funds (2) nationally available for fire research.

It is the sense of the Ogden conference that a strenuous effort should be made to increase fire research funds on a scale commensurate with the job that needs doing, on federal, state, and private lands.

Signed: Frank J. Jefferson, Chairman
Don Beck
E. M. Olliver
J. M. Walley
Wilfred S. Davis
C. S. Crocker
Kermit W. Linstedt
Arthur W. Hartman
F. W. Godden

WASHINGTON OFFICE COMMENT

Committee recommendations Topic 12, paragraph 2 may not be fully understood the way it is worded. It should read:

"Basic research is the highest priority job of Fire Research and as such must be maintained at a consistent level commensurate with availability of current financing. The major portion of the current efforts in basic research should be directed towards completion of those projects of most immediate value to fire administration. Allied with these efforts is the needs to assist fire administration in applying the information now available.

"In addition to the above is the need of carrying on certain short duration fire research projects to provide quick answers to urgent problems of administration."

The problem of deciding what needs first attention in fire research and how to allocate the effort at each experiment station are very proper questions for fire research and administrative personnel to consider jointly. The Washington office will surely weigh their recommendations when approving the project proposals submitted for consideration.

The need of increasing the effort and funds in fire research has, of course, been recognized for some time by this office. The creation of the new W.O. Division of Fire Research to head up the work is the most recent evidence. Unfortunately, in the usual process by which funds are appropriated, fire research has not had the advantage of the customer appeal that has been inherent in some of our other activities. At the same time, fire research accomplishment has been considerable. Slow growth in the men and facilities available through earmarked research funds need not be entirely disastrous to the progress desired, since help from CM-2 and P&M fire control funds and from funds of other agencies is sometimes possible and appropriate in carrying out certain types of projects of benefit to the national fire control program.

At the same time there is need to keep the public informed of what the problems are and what fire research is needed to do a good job in fire control management just as we are endeavoring to do in our other activities. Other fire protection agencies need to be sold too on the value of research to their operations. Some well-executed research projects that produce obvious benefits to them are, of course, the most convincing. Fire Research men need to keep this in mind.

It has not been too difficult to get increases for activities for which there is a definite public demand. So far that demand has not found much expression beyond the desirability of preventing and controlling fires, in spite of our appreciation here of the need.

TOPIC 14. ANALYSIS OF FIRE EXPERIENCE AS THE CRITERION TO WELL-BALANCED FIRE CONTROL SYSTEMS.

This is an old and well-recognized method, by which much progress has been made in the past. New trends and new concepts continually

modify many of the assumptions on which fire plans have been built. What to do to make sure that needed changes do not lag.

Topic presented for information of group.

No Committee Report.

Washington Office Comments: None.

TOPIC 15. FIRE DAMAGE APPRAISAL PROJECTS IN CALIFORNIA.

A joint project between fire research and fire influences groups has been carried out in Southern California and is the most ambitious project of this kind so far undertaken. The project just completed is confined to watershed values. Further work extending to recreation and other values is planned, methods developed and uses of the data.

Topic presented for information of group.

No Committee Report.

Washington Office Comments: None.

TOPIC 16. USE AND ACCURACY OF FIRE WEATHER FORECASTS IN FIRE DANGER RATINGS

Recently a system has been developed in Region 6 by which every dispatcher can convert weather predictions into fire danger ratings to be expected. Several other regions are also working toward making their own local interpretations on a systematic basis.

COMMITTEE RECOMMENDATIONS.

For the most economical use of P&M funds to finance an adequate presuppression fire control organization, daily fire danger forecasts are essential.

The committee recommends:

1. To assist the Fire Weather Service to make the best possible forecasts, the Forest Service should provide accurate daily observations as requested.

2. Recognizing that the Fire Weather Service is not able to provide sufficiently localized daily forecasts for all areas the Forest Service should give more attention to application of the forecasts to local conditions.

3. The Forest Service should make a systematic effort to check the accuracy of forecasts.

4. The Washington offices of Fire Control and Fire Research should actively encourage the Weather Bureau to do more fire weather forecasting research.

Signed: J. A. Mitchell, Chairman
Ralph M. Nelson
William G. Morris

WASHINGTON OFFICE COMMENTS.

Several conferences have been held with Weather Bureau officials here for the purpose of promoting more fire weather research. This effort has proved worth while and will be continued.

TOPIC 17. AERIAL DETECTION PROBLEMS.

Aerial detection is now being utilized, for at least emergency periods, in every region. It has been rather highly developed in Region 1 and is also used on a regular basis in Regions 5 and 9. The degree of dependability attainable, the type of plane, the proper elevation of flight, time of day, relation to topography, and other visibility relationships, still need to be codified. How far can we go from experience to date and what needs to be done to put aerial detection on a completely sound basis?

COMMITTEE RECOMMENDATIONS.

1. From experience in several regions a combination of aerial detection and a skeleton lookout system appears to be an economical method of detection in remote and inaccessible areas where lightning is the principal risk.

2. Before undertaking such a combination detection system, full recognition should be given to the principles outlined in the "Air Operations Handbook."

3. On basis of current experience aerial patrol can not be recommended as a complete substitue for lookouts to detect man-caused fires.

4. Aerial patrol is recognized as a useful method of supplemental detection at times of incendiary outbreaks and abnormal risk from holiday travel, hunting, and other similar concentrated uses.

5. Aerial patrol observers should be specially selected and trained in line with requirements given in the "Air Operations Handbook."

6. The efficiency of any aerial detection system should be checked frequently.

7. Indicated benefits in aerial detection require aggressive programs in perfecting procedures and techniques.

Signed: William G. Morris, Chairman
George M. Gowen
Clayton S. Crocker

WASHINGTON OFFICE COMMENTS.

The committee recommendations cover very well the question of the extent of acceptance of aerial detection in lieu of fixed lookouts from experience to date. They do not include any statement on the problems in need of further research as outlined by Morris, but presumably the committee meant to endorse some active investigations. See appendix.

Questions of the best model plane for detection patrol, the optimum speed and elevation of flight, the modifications needed in the flight route to take best advantage of existing visibility conditions, and the most effective technics for detection of small fires from the air, are all in need of more conclusive determination than has so far been accomplished.

TOPIC 18. DANGER RATING SYSTEMS.

Systems of fire danger rating are now in nearly universal use. The subject is greatly confused by great variation in the basis for the ratings and in the purpose they serve best. More consistency through agreement on at least common denominators is much to be desired. Recently, high accuracy of occurrence predictions in the Northeast gives emphasis to the value of fire inception hazard as a feasible mathematical basis for the fire danger scale.

COMMITTEE RECOMMENDATIONS.

It is generally agreed that the chart shown in Appendix (Topic 18) represents the lines along which fire danger measurement should proceed.

It is possible to combine the "burning index" factors to be specifically indicative of either ignitability of fuels or rate-of-spread, but not both.

For regions having numerous, easy to control fires, burning indexes will be more useful if they are proportional to fire occurrence. For regions having few, hard to control fires, burning indexes should be proportional to rate-of-spread. Some regions may find both useful. It is therefore believed that standardization of fire danger rating systems among

regions is impracticable at this time, although methods of measurement might profitably be standardized.

Signed: G. L. Hayes, Chairman
C. C. Buck
R. M. Nelson
W. S. Davis

WASHINGTON OFFICE COMMENTS.

The original concept of fire danger rating was that it would express the day to day variability in the danger of fires starting, spreading, and doing damage. So far, since the third item is normally implicit in the first two, only the danger of fires starting and spreading have been dealt with. Most danger ratings attempt to combine the two, but there have been deviations toward putting all the emphasis on rate of spread on one hand and toward putting all the emphasis on the likelihood of fires starting on the other hand.

Since both directions of emphasis are useful in particular situations, as is being demonstrated respectively in California and the New England States, they provide a ready argument against any national standardization of fire danger ratings. The committee recognizes this and goes along with the contention in part. The chart by Hayes (Appendix under Topic 18) is an attempt to show the distinction between a rating that is primarily an "ignition" index and one that is primarily a "spread" index. It helps to clarify what has been done, but it does not necessarily set up the best pattern for future development.

An ignition index should represent the relative degree of inflammability of a composite forest fuel. That is the most fundamental relationship of all. The rate of spread of fire to be expected in that fuel is always closely related to it except as permanent factors enter in, such as fuel type, slope, and exposure which do not belong in a danger rating. If these non-variable factors are separately accounted for, about the only distinction left is that wind may change the rate of spread more profoundly than it can change the relative inflammability of the fuel.

The moral seems to be that relative inflammability must be the starting point in all cases as already recognized by the various devices to measure fuel moisture.

Wind is the next most significant factor. It speeds up the rate of spread in most fuels in a rapidly ascending curve, but its effect on fuel moisture may not be significant. The chief distinction between a so-called spread index and an ignition index then boils down to whether fuel moisture is given the greater emphasis or whether all the emphasis is placed on wind once the fuel is dry enough to burn.

This naturally leads to some confusion in graduating a 0 - 100 fire danger scale. If rate of spread is used as the unit of danger, a logarithmic relationship must be divided arithmetically and the top of the range is of such magnitude that only the lower portion of the scale can be utilized for usual fire danger conditions. If the state of composite fuel moisture is used as the chief control, an arithmetic scale comes much closer to conforming to the original concept of a scale like the Centigrade thermometer where the top is the boiling point and the bottom is the freezing point.

Since wind is highly variable and seldom accurately determined for any one local area for even a few hours, it is quite possible that every rating system should start with an inflammability index to which would be applied a fire behavior index. The 0 - 100 scale might then be reserved to the former.

SAFETY SECTION

TOPIC 19. SAFETY IN FIRE SUPPRESSION.

A. What more can we do to prevent fatalities on fires, especially when blow-ups occur?

1. Safety and fire behavior.

2. What action should be completed before next season?

3. What should be our long-range plans?

COMMITTEE RECOMMENDATIONS.

It is recognized that many of our older experienced men are passing out of the key fire-line positions. They have largely been replaced by younger, inexperienced men not in a position to adequately sense "break-away" fire conditions. As a result wrong practices are often put in effect which not only result in fires becoming too large, but their action or failure to recognize a "blow-up" condition is likely to result in fatalities.

There is a vast store of knowledge possessed by our veteran experienced fire men, from analysis of past fires, and from research studies on fire behavior. Your committee recommends the following action:

a. Early completion and analysis of Buck's past fire-behavior studies.

b. From data received from "a" there will be prepared a suitably illustrated training guide for key fire positions which will cover personal safety as it relates to "break-away" fire conditions on large fires. Using this knowledge

the fire boss will train his line foremen in safe procedures to follow on their respective sectors, should certain "blow-up" conditions arise.

c. Prepare a simple code of typical situations for training all levels of short-term personnel to recognize potential dangers on small fires, this training to qualify them to act cool and collected, but have deliberate plans that will assure those working under them that the situation is well in hand.

Signed: F. J. Jefferson, Chairman
K. W. Linstedt
V. A. Parker

WASHINGTON OFFICE COMMENTS.

We must do everything we can to prevent wrong practices which result in larger fires and even, deaths. An initial step is the production of these needed training aids. We will sponsor the preparation of a preliminary code for all levels of short-term personnel use this year. The illustrated training guide will take longer, of course, and will take advantage of the studies of Mr. Buck and others. We will sponsor the production of the first edition a year hence. (See Mr. Hopkins' F(RF) SUPERVISION, General (Training) circular of May 1, 1950 for progress).

The following questions were also discussed by the Conference:

A. How can we intensify supervision and better tie down responsibility to assure safe fire fighting, with instructions understood and obeyed?

1. Ineffectiveness of foremen and straw bosses in insuring safety of pick-up firefighters is a serious weakness. Nearly one-third of lost-time accidents are due to fire work. Ninety percent of the accidents on R-4's Payette fires were to pick-up firefighters. We must recognize the need for better training of straw bosses and act to get the necessary training done.

WASHINGTON OFFICE COMMENTS.

Failures of supervision account for two-thirds of the deaths in the Forest Service (See P.M. Circular 47-47). Supervisory training, especially at the straw boss level on fire fighting, should be strengthened. One important part of this is training in how to give instructions, so they are clear and fully understood.

2. Where preliminary care in selection and basic training is given, the accident rate rapidly decreases.

WASHINGTON OFFICE COMMENTS.

We would like to stress that the sooner safety training is started after employment, the more effective it is. A few words on safety immediately upon employment will pay big dividends.

3. Use of a safety man on project fires to work under the fire bosses is an acceptable practice, but it was decided no mandatory requirement is necessary.

WASHINGTON OFFICE COMMENTS.

See Mr. Granger's F-SUPERVISION, General circular of April 26, 1950 for action taken.

B. What steps should be taken to provide only physically fit men on the fire line?

1. Make pre-season arrangements and decide where manpower will be secured.

2. Exhaust local sources of manpower before hitting population centers.

3. Those doing the screening should know what is required on the fire line. A person may be physically fit from casual checking, but have other defects that will handicap him, such as deafness, too big and heavy for mountain climbing, etc.

4. Separate misfits in recruiting, or early in the game. Even if misfits arrive, screen them out at the fire camp and don't send on the line. Then further screen them, after a shift on the fire.

5. Consider age. It is recognized that we have to take a person's word generally as to being 18 years old, but if we question his age, we certainly have authority to require evidence.

6. Recognize terrain of country as a factor. If fire is in level country, we can be less restrictive than in rough steep country.

7. Use of a doctor to help in recruitment has possibilities. This should be further investigated.

8. Regardless of size of crews, we should see that some of the men have knowledge of first aid. We have been criticized for having men hurt and delaying medical attention for several hours because no competent first-aid man or adequate first-aid supplies were available.

9. Set up check list sheets for recruiters - a recruiter guide.

WASHINGTON OFFICE COMMENTS.

We heartily endorse these nine points. Let's use doctors more frequently when recruiting firefighters. Employment officers should receive more careful training, too. We are working on an up-to-date burn treatment procedure now. We will send that out, and also a Recruiting Check List soon.

CLOSING SPEECH OF A. A. BROWN

Gus and I agreed at the start of this meeting that it always helps a little if some attempt is made to sum up the meeting at the end. I agreed that I would be glad to help do that. I thought my job would be easy -- that Gus would speak first and run through the list of accomplishments and highlights of the meeting and I could do my part by just giving a few words to supplement it. Anyway, I will do my best to rise to the occasion more or less "off the cuff."

As far as I am concerned, this has been a very inspiring meeting. I know you all agree with me. It is the sort of thing we need to do to keep ourselves oriented. We have done it frequently enough in the past that we all know the benefits of such a meeting. We will see some of the results in the form of correspondence and follow-up because there is some specific action to be taken. We have all agreed we want to do certain things. On those things I hope we will go ahead and have something to show.

Another benefit of the meeting that I suspect may be even more important consists of some of the intangible things that I want to try to define for you here because I know you all appreciate them. None of us take ourselves too seriously and some of the by-play has been healthy. Just the same, I think it is worthwhile to remind ourselves once in a while that we, as experts in fire control, have a responsibility that goes beyond any one job or any one locality. It is a real responsibility to the Nation. This is high sounding, but I think it is worthwhile to remind ourselves of it once in a while. This fact and the fact that this whole fire control game is not buttoned up yet -- and we have all confessed that from the start -- is a challenge that I don't believe is exceeded in any other line of work. I believe that is one of the things that makes fire control men enthusiastic and keeps them progressive. It is characteristic of fire control men ever since I have known them and it has been one of the main reasons I have enjoyed the association. So much for philosophy, or oratory, if you want to call it that.

Out of the meeting there are several things that stand out in my mind. If I had made a check list we could make a complete roundup here, but I am passing the buck to Gus on that. Item by item there is a whole list of sound recommendations, ideas, and philosophies that we should sift out and take special note of. I am not going to dwell on them, but I am going to touch on just a few.

I think first of all, on every subject we set up, everyone here was intent on improving our performance in that part of the job. I believe there is a realization of two things involved. We want new and better things. We may even want to reach out and pick up a few spectacular things, but the end result ought to be better efficiency. The best way I know to express this is from a quotation which I came across a little while back, "There is a world of difference between effectiveness and efficiency." Just think of that a minute. Very often we don't. It occurred to me that in that distinction is a good part of the tough job that lies ahead of us. Unspectacular, one item at a time, is the business of converting our Fire Control activities into a very efficient operation. You remember the old alibi when one of our fire men was criticized for faulty work, he said, "Well, we got the fire, didn't we." Behind us there is quite a lot of that philosophy. We are getting to the point that I think Clayton referred to as the "crossroads." He was referring to aerial fire control. We are at that point of change in a good many respects. Part of our job in working through it is this business of converting our whole operation into something really efficient. It isn't enough just to know what will do the job, but we should know as well what is the most efficient way to do it.

Some very nice philosophies came out when Art Hartman discussed equipment development because it was based on this whole business of how we are going to go ahead and make the progress we all want. Because in it he combines a philosophy of practical idealism that no one can quarrel with. We have to do some bold things if we are going to get ahead. Calculate the risks and do it with our eyes open. We should use that kind of philosophy if we are going to break away from old things for something better.

Jefferson, throughout the meeting, kept giving us philosophies that flavored every conclusion that we came to. I hope you all noticed it. I am not going to quote them individually, but if we read this list of recommendations, I would guess it would be pretty hard to find one Jeff didn't have some influence on. That is true in the research recommendations and Jeff doesn't claim to be a researcher, but he is.

When we started talking about the research part of the job, there was a very general feeling of dissatisfaction at the rate of research accomplishments and the slowness at which results had become available. I agree to that and I think everyone in the

fire control game does. We need a lot of things we don't yet have tied down. We need to tie up a method or procedure and know for sure that that is it. As everyone who is heading up a Division of Fire Control well knows, there is pretty general agreement that Hartman's expression of "pack ratting ideas" is something our research men can take seriously. The knowledge they possess, if it is valuable to the field, should be made available. Upon that I think we all agree.

I think you will all agree too, from the fine evidence presented here, that the real solid accomplishment of our handful of fire research men ranks very high and needs no apologies. But most of all we simply must make an effort to increase our research effort, increase funds, and organize the job so that various handicaps that were discussed will not be a real obstacle. Mitchell brought up questions in financing, as you will recall, that were illustrative of the fact that every problem raised resolved itself finally into "we have gotto increase the effort."

I could go on and I know all of you could add to this. I am not going to attempt a whole roundup, but out of this meeting I hope we all have a little feeling of inspiration and a little more push when we go back to our jobs to get more teamwork into this thing and keep it going and to raise our standards and do a more efficient job by all the means we have at our command.

CLOSING REMARKS BY C. A. GUSTAFSON

I have heard Mr. Watts, Mr. Granger, and other individuals at Washington say that on the shoulders of you men - fire researchers, fire control administrators, and those men that deal particularly close with the fire problem - rests the protection responsibility, the success of which makes it possible for resource management to be practiced.

Another thing that I have heard which I might comment on is that in the minds of you men rests dissatisfaction - not dissatisfaction in a destructive sense but in a constructive sense in that you are not happy with the way things are and are continually searching for ways to do a better job. Any support that I can lend, or Brownie can lend, to the difficult job you fellows have in the field of fire control management will be forthcoming. I want you to know we are behind you.

I would like to go over hastily some of the points we have discussed.

Topic 1, Correlation of Functional Administrative Policies.
It seems the consensus of this group that there is a possibility that all functions including fire control are not pulling together as well as may be expected. The situation as I understand it isn't currently too serious but it is one

that requires some attention by all Forest officers. There is a natural reason for it. As you fellows have pointed out, every functional division is under tremendous pressure to get a good job done in his field. However, in order to work together as a team we have decided that we should stop, look and listen, and be ever watchful that what we do does not work to the disadvantage of other functional divisions. If chiefs of all divisions approach the problem in this manner, and there is no reason why this can't be done, progress will be maintained in this team relationship.

From our discussion on our FF bill we came to this conclusion - there are many things in connection with the operation of a fire over which we have no control - high wages, overtime, high cost of material and other things. But on the other hand, we do have control over the management features of the fire job which have a direct effect on the whole FF problem. It is in the field of management that savings in FF costs may be realized; so we must work on these management features to make certain we do everything possible to hold FF costs within bounds. In addition, we should work towards the elimination of those recurring elementary mistakes that are resulting in heavy suppression costs and damages. There is no need for me to identify them for you since they are well known.

In aerial fire control it was very well brought out by Jefferson and Crocker and others in the group that we are somewhat at the crossroads. We have been going along in the aerial operation business and have now reached the point where we must expand, stay stationary, or go backward. You came to the conclusion that fire control men shouldn't think of going backwards in aerial operation; that you should only go forward when the evidence is based on analysis. I think that this is a very sound conclusion. No one, I think, could challenge the right to go forward in any phase of our activities if we have studies objectively made that show that this is the right thing to do.

It was the recommendation of Jefferson that probably we should think of larger "hotshot" crews at strategic places scattered through the West for use on troublesome fires regardless of regional boundaries and thereby save considerable amounts of fire costs. This will receive attention during the winter.

On equipment standardization I got the impression that it is OK to standardize so long as standardization did not freeze fire administrators into a position where they couldn't move around. You want to standardize as much as possible but not to the point where you don't have freedom to do your job.

In equipment development you indicated quite strongly that complete centralization of equipment development work doesn't fit your scheme of things. You would prefer having the program

left rather flexible in order to permit the latitude in equipment development work you need. I also got the definite impression that you want more demonstration of equipment and a record of its probable application and worth so information on use of equipment can be made available to all men engaged in the difficult job of fire control.

In overhead training you men apparently liked the idea of inter- and intra-regional training on active fires and believed it was necessary to use the "going" fire as a laboratory in order to train certain of our overhead. You also feel that the overhead training plan as developed last spring is sound in basis but probably needs a few of the corners rounded off to enable it to operate well. That pleased me quite a bit since without thoroughly trained fire overhead we will have some bad times ahead when the going gets rough.

In initial action trends the main idea I got out of the discussion was that it was after all a thing of management again. There are so many demands on the time of our administrators they are finding it difficult to do a job in their entire field of work but that first things must come first.

Since resource management would become a hollow shell without adequate fire control, it (fire control) necessarily must come high on the list of things to do - first, in many instances.

Linstedt discussed financing versus the increasing protection problem and there was quite a lot of discussion surrounding the need of more P&M seasonal fire funds. The need for more funds can't be denied. I thought that part of the discussion emphasizing the need for more protection funds was good. However, being realistic we can't expect immediate increases in P&M seasonal force funds. The main job immediately ahead is one of management to get the most out of the protection dollar. I believe we all agreed there is room for improvement there.

We didn't have the committee report on the part cooperators may play in increasing our initial attack strength, but the discussion indicated to me that probably there is room for improvement in certain sections of our national forests. Surely this is true on many western national forests.

I would like to say here that you discussed two other points that strike me as rather important.

Basically they involve codification of information now available in connection with fire behavior both in the fields of fire operations and safety. I would surely like to see rapid progress in this field.

You gentlemen have been patiently sitting here all week listening to or participating in a lot of discussions and I will close by saying that I truly think that this meeting was a good one from my point of view and I only hope from your point of view you have gotten as much out of it as I have.

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APPENDIX

TOPIC 1 - CORRELATION OF FUNCTIONAL ADMINISTRATIVE POLICIES:
(Crocker - Chairman)

Digest of Mr. Crocker's paper and discussion summary follows:

Current trends in administration appear to be developing unifunctional practices and policies which affect fire control adversely along the following lines:

A. Shrinking organized reinforcement forces.

1. Fire Control is not organized or financed to meet peak fire loads without the aid of readily available, organized, effective reinforcements.

2. It is not considered practical nor good management to meet the 100% requirements (overhead, operators, labor) for peak fire load periods from seasonal P & M funds.

3. Over the years an organized, trained and effective force of reinforcements has been available from forest force account work crews engaged on roads, trail, bridges, blister rust, K.V., slash disposal, etc. Much of whatever success has been attained in fire suppression is considered due to the availability and use of this type of forces.

4. Current policy trends encouraging use of contract procedure in lieu of force account work in many locations, have resulted in material reduction of readily available, organized and trained reinforcements. There appears to be a trend toward extension of such practices.

5. The Forest Supervisor should be in the best position to provide correlation and integration of the demands of all functional branches (including fire control). However, it is becoming more and more difficult for him to do this because of pressures to contract many of the jobs formerly handled by force account.

6. It is recognized that Fire Control is no exception with respect to functionalizing its activities at the expense of getting resource and improvement work done through available contributed time of fire forces. This is exemplified by the substitution of aerial control forces, concentrated at a central point, for on-the-ground forces who previously handled some road, trail and other improvement or resource jobs on a contributed time basis.

B. Increased hazards and risk and cost of protection.

1. The difficulty and cost of the fire control job in many instances are increased by land management practices and policies. For example:

   a. Increase in hazard and difficulty of control that result from timber harvesting, and stand improvement.

   b. Opening up stands to wind and sun with accompanying increase in potential rate of spread and severity of fires.

   c. Watershed Management advocates a minimum of reduction of fuel hazards by burning even though this makes fire control more difficult.

   d. Risk is increased as a result of encouraged use of National Forests by industry, recreationists, etc.

2. Each functional division has a tendency to set up its procedures without full correlation with the plans, activities and problems of other functional divisions.

3. Increases in funds to strengthen fire control have not kept pace in all cases with the increase of fire load occasioned by many land management practices and policies.

C. With respect to both A and B above -

1. The problems listed appear to stem from lack of adequate correlation and integration between affected functional divisions when establishing policies or practices.

2. Reexamination of present policies such as those previously referred to is desirable to get better correlation.

3. Some progress has been made during the past two years, but more functional activity correlation at the Washington as well as at the field level is essential to correct these trends and prevent further weakening of the fire control organization.

TOPIC 2 - OUR FF BILL AND WHAT CAN WE DO ABOUT IT.
(Godden - Chairman)

Discussion Summary

A. The Situation:

1. In total amount of dollars spent the FF bill for F.Y. 1950 (estimated at $7,000,000) will exceed the FF dollars spent in any previous year.

2. However, if previous expenditures are converted to 1947 - 1948 dollar values and even excluding CCC suppression time two out of four years in the period 1939 - 1942 inclusive would exceed this figure. The other two years would be $5,500,000 and $6,200,000. (See Appendix B-1)

3. If overtime had been payable in 1939, '40 and '41, 23% would have been added to the total FF bill for those years; if 1950 wage rates had been paid in 1939, '40 and '41 the bill would have been increased about 162%; and supplies, equipment and services have advanced about 59% in cost.

4. Added fire risk and an increased fire business has developed through greatly increased use as well as increased hazard due to lumbering and other woods operations.

5. The above increases in cost were in general not within our control.

6. Notwithstanding, considerable concern on the part of the Chief's Office and Bureau of the Budget is felt for a $7,000,000 FF bill regardless of reasons. This poses the question of what can be done to bring these increasing costs down.

B. The Problem:

1. It was recognized by all that it would be a serious situation to have our FF privilege curtailed.

2. The danger in the spring of running out of P&M to cover the FF deficiency is present when such a large amount of FF is involved.

3. From a business management standpoint everyone is interested in getting the job done at as reasonable a cost as possible.

C. The Remedy:

1. The opportunity for reduction of FF costs lies in better management.

2. These opportunities lie within our grasp. Suggested ones include --

a. Hammer at prevention. Pin-point our efforts. Many costly fires could have been prevented.

b. Wages are 50-60% of the fire bill. Here is where management is needed and can show results.

c. Avoid mass manning.

(1) Develop and use more prearranged local coop. help.
(2) Avoid long distance mobilization and attendant high costs.
(3) Use "hot-shot crews."
(4) Recruit only the number we can supervise properly.

d. Improve training of our presuppression forces. Give them practice on fires as a training medium.

e. Get better balance between manpower and machines. Often as many men are put on a fire when machinery is used as would be if there were no machines used.

f. Select and train competent machine operators.

g. Avoid contracts with industrial firms at high priced company job-rates. In this connection, sell the idea that "labor" has a stake in protecting the basis of their livelihood and helping in a public emergency.

h. There was the thought that in some quarters, top management men were so much busier with activities other than fire that the required amount of time was not put in on real fire management prior to and during the fire.

i. Examine certain areas of low value to see if we are over protecting; consider the threat and ultimate cost of suppression at the time.

j. Do not sacrifice aggressive first attack and reinforcement but after a fire gets away and gets large there may be a chance to sacrifice low value acreage and save costs at no sacrifice of control time or aggressive action.

k. No criticism should be directed at costs incident to hitting fires hard to catch them small, rather than "too little too late." The end cost would be much less.

l. Attention should be given to combating the fear complex, which is cropping up, in getting work done on fires.

m. Attempt to improve rate of hand line construction through development of better methods, through better training and better supervision.

n. Machine production rates are also subject to much improvement. Develop methods of getting greater rate of machine line production.

o. There is the possibility of using more and better machinery. Further development of the small power trencher is urged.

p. Current recognition of what a fire is costing may develop more cost consciousness and reduce costs of suppression. This involves keeping a rough check of fire costs day by day.

q. Give adequate supervision to suppression overtime put in on fires to assure that it is productive and fully justified.

r. It would be much more satisfactory if some method of bonus payment during fire season could be provided in lieu of overtime.

s. In the last analysis real financial management in fire suppression is the key. If the action is necessary, and the management and supervision good, the costs will be reduced and defensible.

Paper by Godden follows:

OUR FF BILL AND WHAT WE CAN DO ABOUT IT

Godden

I am glad of the opportunity to discuss this whole field of FF costs. I hope we can come out with a better understanding of what makes up these costs and with some definite plans and policies that will reduce them. We are very disturbed in our Region about the proportions they have grown to and we have just finished a week of searching analysis to see what we can do about it. We came out with a few pretty positive steps that will be followed in the future. I will weave these in this paper later.

In approaching the subject I first made an analysis of the total service-wide costs to see just where they were going and I found that over the years they have varied in actual dollars appropriated from a low in 1944 of 1,635,000 to a potential all time high this year of about 7 million. In looking at the pre-war years I found 2½ million in 1939, 3½ million in 1940 and 3½ million in 1941.

It isn't fair to compare these pre-war and post-war years and say our expenditures for suppression are increasing without first studying what these pre-war bills would have been had we been paying the current wages, overtime, night differential, and the other things that we finance now. In order to make this comparison I separated the gross expenditures into personal services and other obligations and added to the pre-war personal service item the approximate 23% that would have been represented by overtime and night differential pay. This is running in the nature of almost 3/4 of a million dollars. I next added the salary increases which were obtained from an actual weighted comparison of our 1940 wage schedule costs for a given unit of fire fighters plus their overhead as against the identical men and hours paid on the 1948 scale. The comparative unit used costs of $640 in 1940 and $1682 in 1948 -- an increase of 162%.

Other obligations were increased by the amount of the Bureau of Labor Statistics dollar purchasing power using 1940 as a base of 100 and the 1947 base of 159. 1948 and 1949 are actually somewhat higher than this. When these increases were applied to these pre-war years in the same manner as they have been financed in the post-war years I found that the all time high FF year was 1940 with an expenditure of almost 9 million dollars not counting an enormous amount of CCC contribution. I had no way to get at the CCC contribution for fiscal years 1939, 1940, and 1941, but it was a real sizable amount.

From this study as you can see there has been no real increase in the cost of FF, but there has been rather a very measurable decline, particularly so when it is considered that our forests are rapidly transferring from custodial type to a management type forest exposed to greatly increased risk of man caused fires, heavy slash accumulation and other hazardous operations which add to the over-all cost.

I find that the number of recreationists alone service-wide have increased from 16,162,967 people in 1940 to 24,010,964 people in 1948. I have no way of measuring the slash accumulation in the opening up of stands, but in our Region this is a factor of real importance. Neither can I measure the influence of our millions of acres of snag fields resulting from the bug epidemic of the early 30's or the tens of thousands of acres of cheatgrass encroachment into forests that were formerly called asbestos.

I don't give you this to justify or brush off the FF costs as being acceptable. They definitely are not.

The things that I feel we should talk about here today are basic management things that we can do something about and I would like to see this meeting draw out some tangible recommendations for our guidance in cutting down FF. Just to start the ball rolling we are offering a few suggested topics which we believe are of outstanding importance in getting at better suppression management. I am going to talk these out very briefly as suggested discussion topics.

1. First and most important we have got to keep hammering at prevention. In our Region man-caused, Class E, fires for 3 years have cost us $839,026 and have burned for us 100,305 acres, while in the same years lightning fires have burned 57,692 acres and cost $1,221,877. You can see that we can reduce our suppression job if we can stop these big man-caused fires.

2. We have got to keep improving our training and performance of our people and the basic organization that we use. I compliment R-5 on the organization study and I look to the training officers to give us the best possible training techniques to get the most out of our men.

3. I plead with our supervisors to get away from a mass manning complex. Here we are more vulnerable and here we must move in courageously to cut down on numbers of men when they are inefficiently assigned and directed and worked. Why do we get stampeded into thinking numbers of men do the job when a little good sound planning could approach it from the level of the job to be done and send in special experienced overhead, specially assigned crews to do these missions and not leave so much to happenstance and big masses of high priced people. I know many

cases where 25 well led men will do the job of 100 and so do you. Why do we continue to use the 100 and all the tremendous costly transportation, housekeeping and overheading?

4. Paralleling the above we have got to get more skill in the use of machinery - tractors, tankers, trenchers, power saws and in integrating these machines with man crew effort to get the maximum possible output at the minimum cost.

5. Improve our hazard reduction techniques and strengthen our attack calculations so that we can increase the strength of attack and avoid these costly drug out battles.

6. Adjust our wage practices where needed to avoid paying of overtime, high industrial wages, long shifts, and such other costly practices.

7. Avoid long distance mobilization and high transportation and labor costs as much as possible.

8. Continually improve our purchasing procedures and avoid high cost emergency purchasing while fires are going when suitable stocks of staples might have been laid in or accepted on consignment prior to the emergency. Much can be done in using ready prepared foods from central kitchens and catering facilities to avoid these extremely costly fire camps. I found units that required as much as eleven man days to set up camps to feed and quarter up to 150 men. Camps full of cooks and flunkies drawing excessive wages and putting in long hours. The Boise forest has not set up a fire camp to prepare food in camp for two years. When we get it put together we are going to have some interesting costs to study.

9. Properly weight the means of transportation used and use that which is most efficient and economical. Many times in our Region aircraft is the cheapest, but we must avoid wasteful use of high priced transportation where something else will do the job.

10. There is a danger of too much standardization in fire equipment. We find ourselves paying enormous amounts of FF to buy standard electric lanterns for replacement and our dish replacement bill is terrible when we go into the market to get especially manufactured items to fit our mess outfits. We benefit by initial big purchasing of standardized items and we definitely suffer some years later when we would like to keep up replacement. Group purchasing or something else is needed here.

11. I mentioned training and I am going to hammer again at the business of fire suppression planning, organization, supervision and

throw out the challenge that here is one of the really big fields to improve the competence of our people and increase the efficiency of output. The Army takes weeks on maneuvers and drills and we have been satisfied with a couple or three days of improvement crew training. Our jumpers are an example of intensively trained units and for us they are paying off in a big way. Last summer we detailed over 160 of our younger men in various capacities to our big fires and I know this will pay. If we could now supplement this with some high level generalship training in the basic principles of organization and handling men we would have done a lot.

We can think of a few dozen other items of fire management which are important that you may wish to add to the discussion. I leave the discussion with you with the hope that we can come out with some pretty positive policies and plans for betterment.

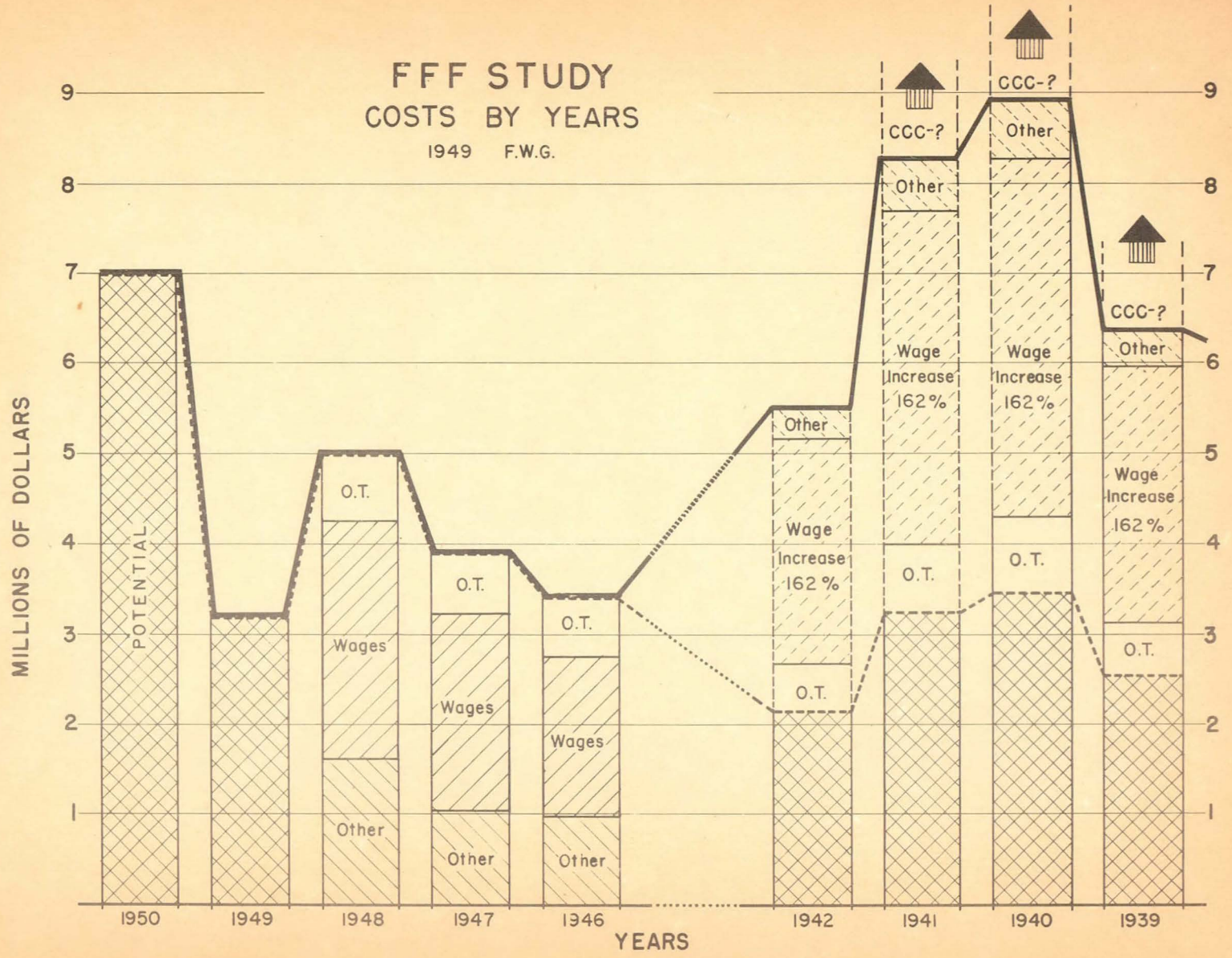
FFF STUDY
COSTS BY YEARS
1949 F.W.G.
MILLIONS OF DOLLARS
MILLIONS OF DOLLARS
9
8
7
6
5
4
3
2
1
POTENTIAL
O.T.
Wages
Other
O.T.
Wages
Other
O.T.
Wages
Other
Other
Wage Increase 162 %
O.T.
CCC-?
Other
Wage Increase 162%
O.T.
CCC-?
Other
Wage Increase 162%
O.T.
CCC-?
Other
Wage Increase 162%
O.T.
1950
1949
1948
1947
1946
1942
1941
1940
1939
YEARS
FFF Costs in Dollars Appropriated
FFF Costs in terms of 1947-1948 Dollars (Does not include C.C.C. contributions)
Based on wage increase (162% actual FS scale), and Commodity Price increase (59%)
BUREAU OF LABOR STATISTICS

Fig. B-1

TOPIC 3 - AERIAL FIRE CONTROL
(Jefferson - Chairman)

Discussion Summary

1. The term "cross roads" signifies that we will be called upon to make a decision as to where and to what degree we substitute aerial forces for ground forces. Should we continue on as at present on further trial basis or go ahead and extend to other forests and do away with lookouts and smokechasers?

2. It was recognized that once we go to air and let improvements (towers, telephone lines, roads, trails or bridges) fall into disrepair there is no return to ground forces. No money can be made available to later rehabilitate these abandoned facilities.

3. Therefore, before further extension or new application of the aerial control program, it is essential to make thorough-going analysis of cost, use and results thus far. Such an analysis would serve as the basis for development of planning techniques and principles for systematic planning. This done, the results of planning would give the answer.

4. A challenging attitude should be maintained and any changes should be well supported.

5. Consideration should be given to the fact that loss of ground forces trends toward centralization and reduces the number of experienced overhead available for large fires.

6. The Flathead Study indicates - Air vs. ground forces.

   a. Detection - little difference in performance or time.
   b. Report Time - air gives longer report time.
   c. Travel Time - Within 12 hours air gives faster travel time.
   d. Elapsed time - Discovery to attack.
      Air is generally better or as good except for the 30 minute and 1 hour groups. Attack, however, is by more than one man and men are fresh.
   e. Burned area record good. Only one 75 acre fire.
   f. P&M saving $19,320 and no increase in FF.

7. All Regions need guide lines to help them check planes and pilots to obtain satisfactory and safe performance.

8. In dropping supplies and equipment to fires it is well to guard against dropping luxury items just because it is so easy to deliver them.

9. There is a productive field open in the selection and training of observers. An untrained observer or one unsuited to the job is too often worse than useless because he doesn't recognize what he sees and frequently provides misleading or erroneous information. Experience has shown that over 3 hours continuous observation results in observer fatigue and a very material lowering in efficiency.

10. Close and frequent personal contact should be maintained locally with Army Air Force bases to keep alive present cooperative arrangements.

11. Points dealing with helicopters.

a. Pilot qualifications are especially important for if lacking we will not get the service desired, enjoy safety or willingness to do the job we want done.
b. One of our biggest problems is to encourage operator to give helicopter pilots mountain training.
c. The helicopter can speed up action on a fire to an unbelievable extent.
d. However, there is a need to train fire men to speed up their thinking to keep pace or be ahead of the ability of the helicopter to give us faster action on the fire line, breaks, hot spots, etc.

12. PROPOSAL. (See Committee Recommendations)

There is a need for hard-hitting, well organized and trained reinforcement shock troops on troublesome major fires to obviate the wasteful, inefficient practice of hiring pick-ups or other inexperienced fire labor for project fires. Such a proposal to cover the 6 western regions is given in the committee recommendations. The locations of 15 suggested bases, are outlined on the map -B-2. Distances and elapsed travel time are provided by attached tables-B-3.

13. Recommendations as to controlling policies in Aerial Fire Control to be added to Chapter A, of the Forest Service Manual are presented in a second set of committee recommendations following the Ogden meeting recommendations.

Outline of Jefferson's discussion follows:

OUTLINE FOR TOPIC 3

AERIAL FIRE CONTROL

Jefferson

Aerial Activity involves many uses of aircraft. Its importance and considerations in Fire Control and for other uses is shown by the following outline.

1. Travel

2. Transportation of men
   - overhead
   - skilled workers
   - smokejumpers

3. Transportation of supplies
   - point to point
   - cargo dropping

4. Reconnaissance of going fires.

5. Other reconnaissance
   - Timber
   - Insects
   - Game
   - Flood
   - Range

6. Special services
   - Seeding
   - Spraying
     - Disease
     - Fire
   - Detection
   - Servicing trail crews, lookouts, etc.

7. Safety
   - Good equipment
   - Competent pilots
   - Approved selection

8. Source of Service
   - Direct F.S. Ownership
     - Personnel
     - Upkeep
     - Investment
   - Contract
     - Selection
       - Aircraft
       - pilots
     - Contracts
     - Inspection

9. Selection and Development of helicopter landing spots

10. Helicopter use on fires
(Transporting men, point to point
(Fire conferences, on the line
(Close up observation of action
(Mapping
(Direction of action

11. Research - Needed for new methods and use of present equipment

12. Training and observation.
An observer must be thoroughly trained before he can observe.

13. General

a. It is essential to control enthusiasm that outruns justification, in the use of aircraft.

b. In selecting aircraft and pilots to use, the safe condition of the aircraft and the required qualifications of the pilots should be checked.

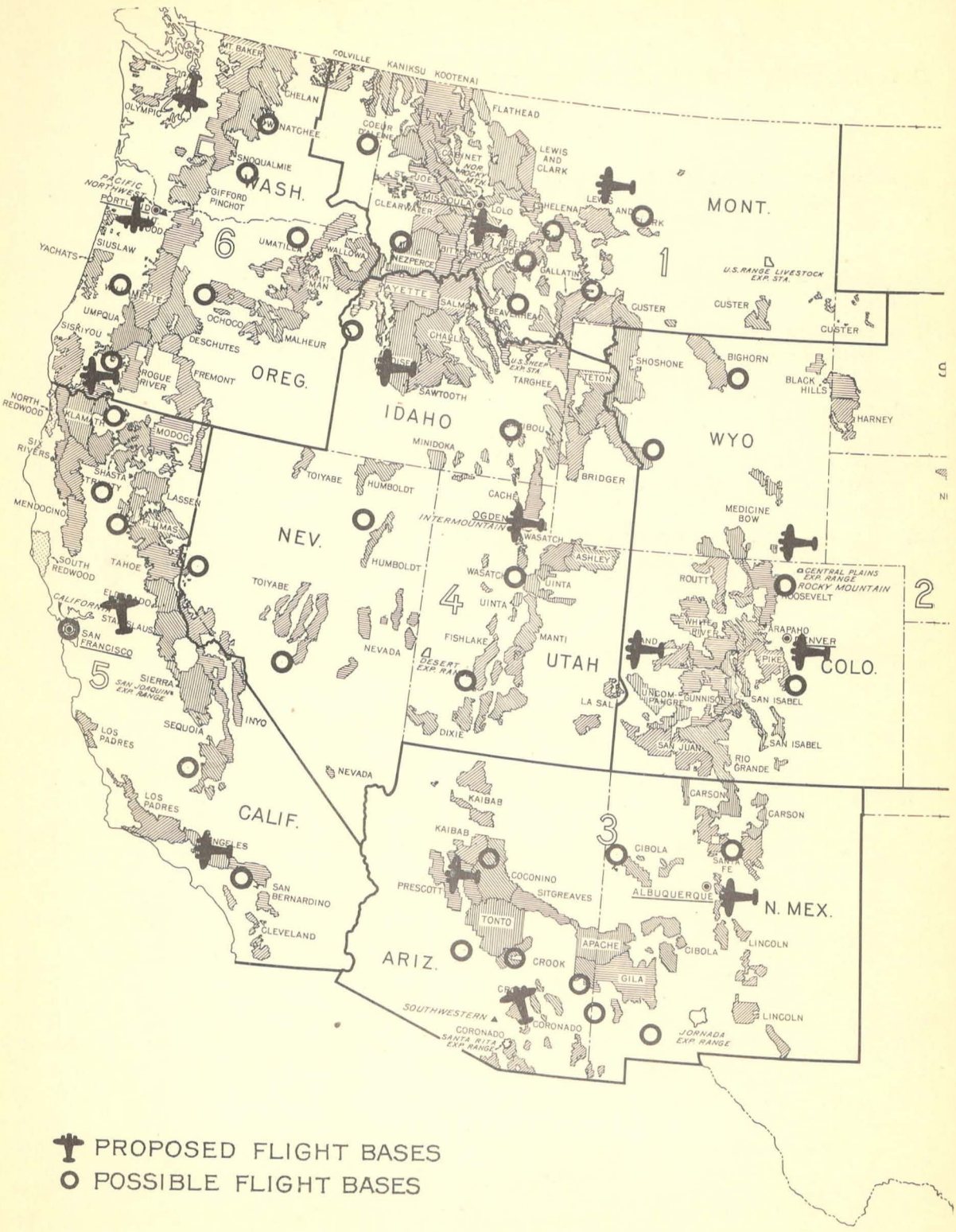
WASH.
OREG.
CALIF.
IDAHO
NEV.
MONT.
WYO
UTAH
COLO.
ARIZ.
N. MEX.
1
2
3
4
5
6
PROPOSED FLIGHT BASES
POSSIBLE FLIGHT BASES

Fig. B-2

B-3

FLIGHT BASES	Albuquerque	Boise	Burbank	Denver	Grand Jct.	Great Falls	Illinois Vly.	Laramie	Missoula	Ogden	Portland	Prescott	Sacramento	Seattle	Tucson
Albuquerque	-	795	675	350	300	912	1060	450	920	530	1160	340	860	1200	325
Boise	795	-	694	644	520	375	400	565	260	275	350	680	460	415	860
Burbank	675	694	-	850	650	1135	665	860	950	625	875	340	375	1025	455
Denver	350	644	850	-	200	625	1000	120	675	380	990	560	892	1030	630
Grand Jct.	300	520	650	200	-	610	825	230	625	240	860	390	700	930	500
Great Falls	912	375	1135	625	610	-	725	510	140	450	575	915	840	525	1090
Illinois Vly	1060	400	665	1000	825	725	-	940	590	600	260	825	290	400	1000
Laramie	450	565	860	120	230	510	940	-	570	330	910	620	870	940	720
Missoula	920	260	950	675	625	140	590	570	-	425	430	880	720	390	1060
Ogden	530	275	625	380	240	450	600	330	425	-	630	480	545	675	650
Portland	1160	350	875	990	860	575	260	910	430	630	-	965	520	150	1165
Prescott	340	680	340	560	390	915	825	620	880	480	965	-	580	1160	200
Sacramento	860	460	375	892	700	840	290	870	720	545	520	580	-	660	750
Seattle	1200	415	1025	1030	930	525	400	940	390	675	150	1160	660	-	1260
Tucson	325	860	455	630	500	1090	1000	720	1060	650	1165	200	750	1260	-

To get lapsed travel time in minutes, divide by $2\frac{1}{2}$

(See next 2 pages)

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OPERATING LOCATIONS

FROM	TO (Nearest Base)	Distance (Miles)	Time (Minutes) Lapsed	Time (Minutes) Get-away	REMARKS
Gallup	Albuquerque	130	52		
Deming	Tucson	190	75		
Lordsburg	Tucson	140	56		
Santa Fe	Albuquerque	50	20		
Colorado Spgs.	Denver	70	28		
Ft. Collins	Laramie	60	24		
Lander	Laramie	190	75		
Buffalo	Laramie	210	84		
Helena	Great Falls	70	28		
Dillon	Missoula	140	56		
Livingston	Great Falls	80	32		
Butte	Missoula	90	36		
Pocatello	Ogden	125	50		
Lewiston	Great Falls	80	32		
Weiser	Boise	60	24		
Grangeville	Missoula	120	48		
Beaver	Ogden	220	89		
Provo	Ogden	75	30		
Flagstaff	Prescott	70	28		
Globe	Tucson	90	36		
Clifton	Tucson	115	46		
Phoenix	Prescott	80	32		

FROM	TO (Nearest Base)	DISTANCE (Miles)	TIME (Minutes) Lapsed	TIME (Minutes) Get-away	REMARKS
Ontario	Burbank	50	20		
San Francisco	Sacramento	75	30		
Porterville	Burbank	180	72		
Chico	Sacramento	100	40		
Red Bluff	Sacramento	135	53		
Montague	Ill. Valley	75	30		
Reno	Sacramento	125	50		
Medford	Ill. Valley	50	20		
Pendleton	Portland	190	76		
Eugene	Portland	120	48		
Redmond	Portland	140	56		
Tonapah	Sacramento	235	94		
Elko	Boise	200	80		
Yakima	Portland	135	54		
Wenatchee	Seattle	100	40		
Spokane	Missoula	180	72		

TOPIC 4 - EQUIPMENT STANDARDIZATION
(Linstedt - Chairman)

Discussion Summary

1. Need to guard against standardization stifling initiative.

2. Be selective in standardizing. Standardize those items justifying standardization but go commercial on those where there is no special advantage to standardization.

3. More often than desirable there has not been adequate survey of the needs of the field and survey of products on the market which will fill the field needs. In many cases this will result in an advantageous compromise.

4. Standards must be kept up to date to make them usable.

5. New standards should be set-up only after the proposals covering them have been routed to the field and suggestions solicited.

6. It was urged that lookout structure designs be kept simple, cheap and easy to construct, without frills.

7. We should recognize that we have a tendency to "damn" equipment because we haven't trained our men how to use it.

8. It was emphasized that it would be well worth while to go further in working with manufacturers in design to take advantage of their technical skill.

Paper by Linstedt follows:

EQUIPMENT STANDARDIZATION

Linstedt

Why Standardize?

In standardizing, we run the risk of limiting if not eliminating initiative. Initiative in development of equipment within the Forest Service has been responsible for much of the progress we have made over the years. Because this initiative is a desirable thing and something to be preserved is not to say that we should avoid standardization where there is advantage to be gained in so doing and I stress the word advantage.

Each desire to standardize equipment should be analyzed from the standpoint of what we may gain through standardization.

Certain standards of axe specification and others have met the test of time and have given us an advantage in larger volume of purchase from an individual manufacturer.

Other items of equipment, such as tents have been perfectly acceptable to us as manufactured for general use and no standardization becomes necessary.

Still other items are in the questionable category and it is those we are most concerned with.

As an example, I feel that we have reached the point or gone by it, where we should adopt 2 or 3 tank trucks as standard in an endeavor to interest the commercial manufacture of such units.

There are numerous other items of equipment that are in this questionable group and they should be explored in an effort to gain an advantage in price and availability. If such can be shown to exist we should adopt these items as standard -- if not we should go our own way.

I propose that we follow a system of developing standard specifications for the best equipment we have in each class. These specifications should be subject to constant review and improvement. As certain items become generally accepted and a definite purchase advantage results from having them standard for the Service.

On the other items and probably the most of them the best specifications we have should be developed as an aid in purchasing and to nullify duplicate work on similar items and placed in our equipment handbook.

These items should be marked optional and regions could use them or leave them as they saw fit.

Possible items for consideration:

1. Tankers
2. Pumpers
3. Plows
4. Mess equipment
5. Paper beds and other beds.
6. Spark Arrestors
7. Hose and fittings
8. Hand tools
9. Back-pack cans

TOPIC 5 - EQUIPMENT DEVELOPMENT

(Hartman - Chairman)

Discussion Summary

1. Each equipment development proposal should be analyzed from the following angles:

   a. What do we want it to accomplish?
   b. Has a fire boss had the opportunity to express his views on the possible field application and the degree to which it will meet the problems of the field man?
   c. Is there any equipment in the commercial field that will accomplish the job without recourse to special development?
   d. If no commercial product available, will this proposal do what we want?
   e. Will this pay-off?
      Speed up work.
      Do a satisfactory job.
      Save money, acres or damage.
   f. What can be done to make the proposed equipment meet the needs of another Region or other functional activities?
   g. What priority does this proposal rate in comparison with other projects in progress or proposed?

2. In considering the question as to whether development work should be concentrated on line building equipment it was the consensus that this type of project should have top priority but that other smaller items (nevertheless needed) would not be ruled out. Each smaller project should survive a rigorous screening process, however.

3. Care should be taken to avoid spreading our efforts and funds too thinly as the common result would be accomplishment in none.

4. The trencher tests to date indicate that this tool has great promise in increasing our rate of line production. There was general agreement that the trencher project should be pushed to completion. A suggestion was made that when ready for production, that it would be desirable to provide wide-spread demonstrations of what the trencher can do by a traveling skilled operator.

5. The idea of a traveling equipment team, skilled in the operation and potential uses of any new developments, was considered applicable and very desirable.

6. The use of skilled demonstrations during the development stage of new equipment of potential wide use have an added advantage of developing a potential market -- which in turn may aid in interesting commercial manufacturers in production of the tool machine or device.

7. It seems obvious that considerable aid in design of many items of equipment can result from efforts to interest manufacturers in working with us and furnishing technical aid and facilities. These possibilities should be explored to the limit.

8. The same observation that was made under Equipment Standardization was considered to apply here also. This is that we should be sure that we do not condemn either our present equipment or new developments before we have given them a thorough trial or before we have fully trained our men in their operation, potential use or use to best advantage.

9. Investigations into wetting agents so far indicate that we can get much greater results in training our men how to apply water properly in fire suppression, than we can ever hope to gain by the use of detergents. Therefore, such training in the use of water assumes high importance.

10. The question of centralization of fire equipment development in one, two or three centers in the Nation was discussed pro and con with the final consensus being covered in committee recommendation number 5.

Paper by Hartman follows:

EQUIPMENT DEVELOPMENT

Hartman

For the purpose of today's discussion, I take it that we should confine ourselves to fire equipment which is power driven. Such equipment falls into two general functions:

a. That which will deliver fire line necessities with speed and reliability; and
b. That which under given sets of conditions, will help establish a control line to a minimum standard at a speed balanced with local rates of fire spread.

1. TRANSPORT

Nationwide, the quality of fire suppression results will be found to be parallel and proportionate to the amount of time elapsing between discovery of a fire and the start of control work by a force sufficiently strong to hold the fire. There are found vastly different rates of fire spread in different parts of the country. That fact does not alter this principle. It does set forth "rate of fire spread" as a primary local factor against which the value of possible types, designs and units of equipment can be intelligently measured.

I see no differences functionally between delivering men and tools at a fire via airplane and parachute, by motor boat or by truck. It is just a question of delivery method best adapted to local topographic conditions.

Decisions as to types and capacity of transports must be subordinated to and follow determination of the equipment to be used on the control line; that design of transport which will best deliver those things most needed on the fire line.

Fire Line Equipment

This is too large and detailed a subject to permit more than highlighting those things experience has underscored. I will have to dwell on the fire equipment history and experiences of R-8 to bring into relief those principles and approaches we now believe to be the most significant.

Region 8 protects:

Mountain areas	8,857,553	acres
Piedmont (rolling)	1,260,217	"
Flatwoods (costal plains)	5,420,730	"
	15,538,500	"

Fire spread is fast in the mountains, moderate in the Piedmont and extreme in the flatwoods. Incidence of fire occurrence per unit of area is the highest in the country. Fires occur every month of the year. Many are planned incendiary fires with numerous sets at places presenting the most control obstacles. These facts do not create principles effecting control any different to those applying to regions with different conditions.

They did combine to create a situation of the greatest urgency and threatened the severest penalties for failure to develop effective control facilities.

Of more importance to this discussion, the multiple thousands of fires, high rates of spread and year around burning conditions make it possible to take an idea or likely design and carry out numerous tests on actual fires under a variety of conditions in a short space of time. Findings from tests--bugs, or likely improvements could be incorporated into equipment and retested without waiting for another fire season.

We did not have to resort to simulated testing situations, extend curves or make assumptions. Comparative analytical data were drawn from thousands of fires. The severity of spread conditions revealed and magnified the adverse or advantageous effects of factors or designs being tested.

This combination of urgency and opportunity made it possible for R-8 to identify values and move much faster in equipment development than probably any other region could have done.

Effects of Equipment

There is attached a table covering R-8 fire history for the past seven years, which brings into focus relationships between equipment strength and control results. Acquisition of equipment and controlling it by radio is not the whole story, the jumps in betterment are so significant and consistently in line with expansion of equipment use as to compel recognition of its major value.

During this period some equipment has been placed in use on 41 of the 60 ranger districts, including 15 mountain districts.

Actual suppression costs have dropped each of the last three years even with the purchasing power of the dollar declining.

Simultaneously, the state foresters of 9 southern states, and various industrial land owners have embarked on some degree of fire line and transport mechanization. In passing, we should note that records will

show that those organizations have made comparable advances in fire control results about proportionate to their degree of mechanization.

There follow statements which summarize some of the more important equipment lessons we have learned from experience:

1. There are no all-purpose weapons; 999 out of 1000 are not average fires burning under average conditions. One cannot shoot at the flock and score well... pick a single target at a time and take deliberate, precise aim.

2. The field is made up of a large number of separate and greatly varied problems. Those problems must be indentified, analyzed and solved individually.

3. Almost any piece of equipment looks good when used under favorable conditions.

   The crucial test any type of primary fire equipment must pass is ability to deliver when burning conditions are bad, when failures result in project fires and exorbitant costs and losses.

   Cheap auxiliary equipment has a place and can save costs if used or depended upon only on easy fires within its capacity. The most costly approach in the long run is to sacrifice quality for lower first cost investments, when such savings result in "fair weather" equipment which fails when the checks are down.

4. Ground and cover conditions in R-8 have forced the development of four distinctly different sizes and types of tractor plow equipment.

5. Design of equipment begins at the fire line and in the following general sequence:

   a. Determinations by fire fighters as to the more vital operations where they are now handicapped and which might be done better by equipment, the acceptable specification to which a job must be done, and acceptable rates of performance.

   b. Design of equipment which will meet those standards. Trading of features, weight for speed, power for weight, etc., to be done only with concurrence of fire fighters.

   c. Simultaneously, transport to be designed to balance with the equipment unit.

   d. Do not fix design until after numerous readjustments based on tests under field conditions.

The program propounds some questions:

1. Is progress of equipment development as rapid as we should expect?

   The answer is NO.

2. What should be done?

   In these four words are wrapped up the major Servicewide questions of organization; finance; philosophies; will to venture on to new ground. The whole field of where the Service is headed in Fire Control.

Perhaps we will get farther by asking the question another way. What has not been done that could have been done?

Every one in the room can call to memory actual past fire situations where you are sure that proper equipment, if you had had it, could easily have accomplished work which you had to push through the slow, hard way, and would have made the difference between a hold and a lost fire. What were the barriers which kept you from having such equipment? What has been left undone that continues to leave the Fire Bosses in that position? Rather than posing a speculative question as to what might happen, why not look back for those concrete things which have hindered progress, and consider appropriate attack on each.

The situation varies by regions, but some of those things which might be looked at are:

The degree of responsibility and authority delegated to fire control men; how much backing they can expect when they stick out their necks. No one can hand any one a formula and a ready-cut solution. Development of a new field requires venturing; freedom to exercise best judgment and be sure it will be backed through trial and error; freedom to invest money and time on a likely idea and if it does not work out, to toss it aside without qualms and start over.

Men in organizations sometimes are hemmed in by philosophies of "never try anything which has not been proved" -- a sort of let George try it first attitude. Organizations lose their momentum when there is advantage of security in just conforming with what is; in just keeping the nose clean.

To whatever extent such things now prevail, the Forest Service must be prepared either (1) to be satisfied with a complacent, static position in fire control, passing leadership to someone else, or (2) take a

positive, constructive position which facilitates and applauds the application of ingenuity and initiative to unwhipped opportunities.

Financing

I doubt that any appreciable amounts of additional funds are needed to get sound equipment development projects under way. Each Region can take some calculated risks. Dispense with enough present positions or operations to release needed funds. Accept a few temporary sacrifices in results in the interest of reaching a more secure position. Such work becomes expensive only when it is surrounded by ponderous boards, overcautious formalized procedures and indecision.

The stakes are immense. We spend over $6,000,000 in P&M; in the last half year over $6,000,000 FF. Fire damage losses run over $2,000,000 a year. Any progress which could result in as little as a 5% improvement would be worth 3/4 of a million a year. Can we afford delays in the face of such odds?

Successful equipment soon pays its own way in suppression savings alone. When money is spent for hand labor all we have left is dead fire line and time slips. When money goes into equipment, we have residual values what can be used again and again.

After reliable equipment units are developed, then available finances will determine the rate at which duplicate units will be placed in service at appropriate locations. Once under way, enough opportunities for savings are created to permit fairly rapid expansion.

Pulling the Trigger

The key to the solution of most problems usually is created at the moment the decision is made to start something. So-called considerations, discussions and contemplations, when long-drawn out, build up a mass of doubts, ifs, buts, excuses and uncertainties. The reasons why something might not work just keep building up the fears and indecisions. Once one plunges in, the water usually is not as cold as it looks. Things which appeared tough and even unsurmountable are found to be not near as resistent, once they are tackled.

Experience over even a short space of time changes viewpoints and sense of values. The improbable becomes common place. In the early twenties I saw for the first time, a man make a jump from a plane. Thousands of folks watched him with open mouths, and concluded he was doing an insane thing.

After imaginative men applied themselves to developing the subject, in a few years the Service had a smooth working smoke jumper outfit, doing as a normal job many things which intelligent men would only yesterday have declared impossible.

I suspect that a study to identify what actions made development of smoke jumping possible, would reveal those things essential to the active development of other major equipment possibilities.

Selling and Demonstration

There is no need for each region to make duplicate trips over all the exploratory ground. The fundamentals are pretty well known. Available power plants are likewise well known. There is a fine backlog of men of proved skill and effectiveness in developing and using lines of equipment.

So far as speeding up appreciation and use of equipment is concerned, the important thing is to demonstrate to and sell experienced fire bosses the knowledge that there are easier and more effective ways of accomplishing much of his work. Once a field demand is developed, that pressure will force equipment to appear.

In my own judgment the Service will continue to lose time and waste hundreds of thousands of dollars annually in unnecessary and expensive hand labor methods until a travelling demonstration team is brought to life. It is just like selling compressed air jackhammers in place of hand drills to old time hard rock foreman.

Important to keep in mind is the relative place of different functions in equipment development. It is not a matter of mechanical engineering. Mechanical engineering is essential but its place is facilitating.

The highpoints are: What are the most essential things the fire boss wants done; how to ease and speed the way of doing. Creating and selecting the right equipment for the particular job are essential phases. The big end of equipment development is in attaining the proper use of equipment; skills in doing the job, together with economic balance and strategic placement.

Again, we get back to demonstration.....not just the tool, but what can be accomplished by a man who knows how to use the tool and get the best out of it. Until equipment in the hands of skilled users, and under the direction of men wise in the ways of fire actions and control tactics, are making demonstrations far and wide, it will be difficult to characterize the general status of equipment development by any other term than half-hearted.

Should we abandon work on development of facilitating equipment and concentrate on items of necessity?

First things should come first. I believe, however, the Forest Service is a capable enough outfit to swing both simultaneously. It is purely a matter of balanced values and vigor and quality of effort.

What about centralization of such work?

That depends upon the concept of centralization which would be applied. We must have a centralized positive leadership. A central agent for gathering and disseminating ideas, information on successful developments and established findings. An intelligence service. Someone who will accept the responsibilities and woes of an expediter; hunt for and attack hindrances wherever; smooth the way and give the men who are trying, all the backing they deserve. The centralization that does extension work; that can recognize and point out opportunities and arrange for competent help and facilities; that with real justification, sparingly exercises a power of veto.

If centralization is conceived as including evolving equipment types, performance specifications, trials, improvements, and final determinations as to what kinds of equipment are best in each general area, in short, as doing for the field the jobs of creating, deciding and assigning types and number of equipment, my personal view is that we would be going at it in the least promising and most ineffective way.

On the one hand, there are too many complex problems, so many areas having widely different combinations of characteristics, for any one nationwide authority to know and analyze in sufficient detail. A centralized authority would rapidly become bogged down in a maze of detail and be smothered under heaps of inactive projects. Good men thrive on responsibility. The secret of progress and strength of the Forest Service has been the assignment of responsibility at the level of intimate familiarity with the problem, accompanied by authority and facilities, guidance and support.

If the Forest Service type of administration is admitted to be sound, why not avail ourselves of that strength in equipment development?

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RELATIONSHIP BETWEEN NUMBER OF UNITS OF FIRE CONTROL EQUIPMENT AND RESULTS- Region 8

Year	# Tractor-Plows All Types	# Tankers	N.F. Acres Burned	#Fires	# Fires Class D (Inc. outside fires)	# Fires Class E	% Class C,D,&E	Avg. NF Acres lost Per fire	# Extra Period Fires
1943	16	5	116,657	3834	244	91	43.1	30.4	37
1944	31	5	61,409	2462	119	35	39.1	24.9	24
1945	51	5	39,586	1977	83	31	36.7	20.0	8
1946	75	5	35,347	2816	90	21	35.6	12.5	3
1947	91	14	48,249	3482	138	26	34.6	13.8	6
1948	103	19	23,832	2358	66	17	29.0	10.1	7
1949	111	19	13,439	1840	23	15	27.3	7.2	2

TOPIC 6 - OVERHEAD TRAINING

(Davis-Chairman)
(Talley-Co-Chairman)

1. Emphasis was placed on the necessity of preparing a definite training plan in order to make the program effective, and following it.

2. If and when financial conditions permit, it would be desirable to detail trainees for 2 or 4 weeks to another region, during the height of the fire season, so they would be on the ground for large fires or possible lightning concentrations.

3. It was generally agreed that the job of dispatching for the inter-regional training program be rotated annually between the western regions -- Region 5 taking it for the 1950 season.

4. A poll of the various regions indicated that a large number of trainees were detailed to fires within the region. A lot of valuable training was accomplished. However, very few inter-regional assignments for training were made. This was due in part to regions that had large fires not promptly informing the dispatching center and the dispatching center not contacting the other regions.

5. Regardless of whether men are sent specifically as trainees, it should be recognized that much valuable training is received merely by experience on fires. This is particularly true where forest officers infrequently have large fires on their own forests.

6. In all training deals it must be kept in mind that there should be sufficient "doing" to justify the use of FF.

Note: No formal paper presented

TOPIC 7 - INITIAL ACTION TRENDS
(Beck-Chairman)

Discussion Summary

In discussing the questions asked by the Chief's office in the title of this topic, the following observations and recommendations were considered the most important.

1. The fact that many small fires have become large fires can be attributed to inadequate initial attack. Inadequate attack may be due to:

   a. Failure to meet elapsed time requirements.
   b. Fewer men due to decreased funds.
   c. Poor quality of action after arrival by the initial attack man or force due to inexperience or lack of adequate training.

2. There has been a general tendency to be less attentive to initial time requirements than in past decades. This tendency can be attributed to:

   a. Increased emphasis on large fire preparedness, organization, etc., at the expense of current attention to initial attack.
   b. The tendency for administrative personnel to consider that fire is not in his field due to the increased emphasis on each of the many other activities to administer.
   c. Personnel less experienced in fire due to decreased fire business in a given unit.
   d. Lack of current local emphasis on the importance of initial attack time requirements.
   e. The fact that former time standards, in many cases, have become obsolete due to changes in cover types, transportation methods, new techniques or facilities, and time required by less experienced dispatcher to make his decisions, and have not been revised. Reappraisal and revision of time standards is now necessary.

3. Without minimizing the need for having qualified men in all fire positions down to the lowest grade, it was emphasized that, in particular, every effort should be made to assure that each District Ranger, Fire Control Assistant (or Ranger Alternate) position be filled with a qualified fire-trained man. Or where this is totally impracticable that planned training be given immediately after assignment to such position. It was acknowledged that quite a few of our men do not know the fundamentals of suppression of small fires.

4. In planning as well as in supervision and management there is need for taking initial attack time requirements into account. This includes:

   a. Placement of initial attack forces.
   b. Balancing initial attack placement with large fire preparedness to meet current protection allotments available.
   c. Recognition that planned reinforcements play an essential part in the success or failure of initial attack.
   d. Taking into account relative values of different areas, but with concurrent recognition of the threat from fires in low value areas and the possibility that high suppression costs may result if proper initial attack and reinforcement is not provided.

5. The analyses of initial attack and other phases of fire control such as supplied by the Chief's office in 1949 were considered well worth while. They have aroused a renewed interest. They have resulted in local checking as to reasons for the undesirable trends where these exist, and have provided an incentive to determine why the shortcomings and how to remedy them.

6. The decreased purchasing power of the dollar in protection allotments has affected both the strength of initial attack and the number of stations that could be manned (this in turn affects the time first attack can reach the fire). However, the question was raised, "Have we done all we can in the budgeting of our protection funds to provide for the maximum force of fire-goers? In the face of less available money are we perhaps spending a disproportionate amount on fire "overhead" positions, equipment, facilities, etc., at the expense of attack forces."

Paper by Beck follows:

INITIAL ACTION TRENDS
Beck

Gus gave me a real load when he assigned the subject of Initial Action Trends. This is the touch-down, the pay-off for all our other planning, organization, equipment purchasing and training program. You can cover the whole field of fire control when you open the subject for discussion.

Whether we like it or not, and always admitting there is plenty of room for argument when statistics for a whole region are reviewed, and compared with other regions, we have to recognize that the initial attack statistics, plus area burned and costs, are the criteria we must use to determine the quality of the fire control job.

Back in 1923 at the Mather Field Conference, and long before the days of aircraft, smokejumpers and tankers, almost all the emphasis was placed on speed of initial action from first discovery to dispatch of first reinforcements, if required.

At the same time due to difficulty of moving manpower and equipment, emphasis was placed on having the district ranger made responsible for prompt and effective initial action. As a result of that conference and the pressure which was applied from the top toward securing a good fire control job at the district level, fire control was really given first priority in all regions. Kelley, Loveridge and other inspectors at the Washington level participated in Regional Boards of Fire Review with the result that additional emphasis was given to speed up in initial attack.

We have all had an opportunity to study the comparisons made for initial attack data between regions as shown in the F-STUDIES letter of December 5, 1949. As Gus points out, conclusions as to whether one region or another is more efficient cannot be determined from the results. There are too many variables in fuels, occurrence, weather, terrain, organization, and equipment.

For the past three seasons, Region Three forests have been working up initial attack data by positions listed on the Forest Organization Chart, i.e., for the short-term fire control positions. This has resulted in many changes, some eliminations, and some additions to the organization.

Gus asks the question: "Do we need to give new attention to improving initial action performance in our fire control job?" I believe the answer to this one is a definite "yes". Two years ago Loveridge made the statement that in all reviews of fire action in which he had participated, a large fire could have been avoided by properly planned and executed initial attack. Probably in ninety percent of the cases we have all reviewed, we would have to agree that he was correct.

Gus also asks: "What are some of the things which may be done?" This is where you stop and start to consider if the present record is satisfactory. Even allowing for the freak action and time elements on some of the reports, we can all recall, when you consider the data shown on the December 5 letter, I don't believe a single one of us is satisfied with his Regional Record.

For what they may be worth and as a lead-off for discussion on the subject, here are a few things I believe we should consider in an effort to improve our initial attack action.

1. A lot of the fire work done during the past ten years at the Supervisor and regional level has been directed at the training, organization, equipment and SOS required to control large fires. This would also apply to the distribution of regional finances. Possibly we should take a fresh look at what proportion of the available time and finances should be devoted to large fire control and to improvement of initial action on small fires.

2. Consider the possibilities of setting maximum time limit standards for initial action and requiring an explanation on fire reports where these time limits are exceeded. Personally, I feel there are so many variables such standards to be worth much should be set by individual ranger districts.

3. Consider the possibility of having each forest analyze reports of initial action by ranger districts and send around district comparisons each year with appropriate comment. If such comparisons are worth while for the regions, we should get them down to the ranger district level where the action can be improved.

4. Consider the possibilities of establishing a level which will determine if a fixed detection station will be continued in service and if funds used for detection could be more profitably expended on other measures which would reduce attack time. Will contract aircraft detection serve our requirements, particularly during pre and post-season periods?

5. How far shall we go in requiring the district ranger (or his wife) to act as dispatch officer and what criteria should we use to set up a district or forest dispatcher position?

6. How far should we go in securing better radio or telephone service from fire funds to improve report time?

7. Should we insist the district rangers, rather than the sub-ranger fire personnel carry responsibility for their initial action time records?

8. What effect should values at stake have on initial attack? You can probably think of a lot more possibilities in reference to your own regional practice, but at least these should serve to open the discussion and give us an opportunity to explore the problem.

TOPIC 9 - FINANCING THE INCREASED PROTECTION PROBLEM AND GETTING THE BEST USE OUT OF THE SCARCE P & M FIRE DOLLAR

(Linstedt - Chairman)

Discussion Summary

1. The protection finance situation.

   a. Dollars buy less now.
   b. 40-hour week and overtime rates add to protection costs.
   c. No free labor such as CCC, CPS etc. available.
   d. Demands on the time of protection on other activities is heavier than formerly.
   e. Increased use, risk and slash increases the protection problem.
   f. Little prospect of increased fire P&M.

2. It is wise to guard against complacency based on a series of relatively easy fire years for the country as a whole.

3. The possibility of providing supplementary protection to National Forest slash areas, available under present Manual instructions has not been used to anywhere near the extent justified. Bolstering protection on such areas by such approved means should not be overlooked.

4. Get States to pay full costs of protection of private lands within the National Forests, that are protected by the Forest Service.

5. Suggestions as to possibilities of making our present allotment dollar go further were -

   a. Provide man and wife combinations for manning of lookouts where seven day service is required. This will give an extra fire-goer, as well as saving overtime.
   b. Recruit better qualified personnel
   c. Substitute aerial detection for ground detection. Useable in lightning fire areas, but could result in costly failures in man-cause occurrence areas.
   d. Use fire danger rating to a greater degree - take advantage of low danger days to place protection men on project work and project payrolls.
   e. To make (d) practicable closer integration of functional plans and funds is necessary.

f. Make our prevention effort more selective. Will save prevention dollars or make them available for presuppression. Reduction of man-caused fires could also be expected.
g. Perhaps sacrifice some contributed time now spent on other functions.
h. Concentrate attack forces in the high danger country.
i. Create a sympathetic active understanding by District Rangers, Fire Control Assistants and guards as to good time and fund management. Will aid materially in getting more for our money. Allowing protection savings to be retained by the Forest for other protection purposes is an incentive to better management.
j. Analyze Fire Control Assistant job loads and work towards getting each function to pay its proportionate share, particularly in non-fire season.
k. Also work toward having other functions finance their share of fire control, communications costs, maintenance of airfields etc., and other similar costs.
l. Check fire caches and reduce to actual needs, resulting in savings in time for maintaining, storing, inventorying etc.
m. Avoid making fire fighting agreements with industrial outfits at wage rates agreeing with high company rates. Attempt to have all such agreements at Forest Service rates on Forest Service payrolls.
n. Vary intensity of protection for different localities in accordance with values at stake, potential threat to higher values and potentiality of high suppression costs.

6. Perhaps we need to revamp our old fire control objectives to meet tolerable losses as set by land managers in the resource divisions. A definite need was expressed for reliable data on value zones to aid in proper planning for placement of protection forces.

7. A general picture of where the allotment dollar goes is:

(a) Approximately
(1) 14% into the general allotment base
(2) 40% into salaries for initial attack men, patrolmen, lookouts, etc.
(3) 46% into other than 1 and 2.
We should work on the 46% to see how much of this we can apply to build up our front line forces. In making an analysis of the 46% it would be well to ask the question of ourselves, "Are we evaluating properly what we are doing and what we are using our protection funds for? Have correct priorities been set?"

This is a real challenge -

(1) Recognize there is lots we can do in bettering fire financial management.
(2) Do all possible to detect loopholes.
(3) Take action to plug all loopholes.

8. There was general agreement that we need more protection funds, even after we have applied the best management practices and measures listed in paragraph 5 above.

9. Thus far this need has been inadequately presented to the Chief's office. Regions should be sure their plans are sound and that the requests are fully supported by factual justification when presented.

10. Our overall national record indicates that a good job of protection has been done. The true situation becomes distorted by overall statistics if we do not recognize the effects of the large fires on working circles, regeneration, water supplies and industries related to forest resources. Damage figures we have been using do not come anywhere near presenting the total damage. When we use our Nation-wide acres burned and incomplete damage figures in connection with budget presentations etc., it appears that we are defeating our own purposes by indicating that we are doing a good job with present appropriations.

Paper by Linstedt follows:

"FINANCING THE INCREASING PROTECTION PROBLEM AND GETTING THE MOST USE OUT OF THE P & M DOLLAR"

Linstedt

From a high in about 1944 our P&M dollars have gradually been eaten up by increasing costs; the 40-hour week; overtime; reclassification and other things so that at present in spite of a higher number of dollars, we are in the position of actually being able to buy less protection than we were in 1932. This is in the face of increased heavy industrialization and recreation use in the forests, with consequent increases in both hazard and risk. Indications are that recent attempts by the Forest Service to get increases in P&M allotments for fire control, have not had very sympathetic treatment.

The only recourse for the fire control administrator then lies in getting better use of the dollars he now has if he plays the game with FF and tries to accomplish the same standard of protection that has been given in the past.

And here I would like to pose a question for consideration by the group. "Do we fit our protection standards to the P&M dollars appropriated by Congress to do the job? -- or do we maintain the same standards we have had in the past and draw on FFF emergency to make up the difference?"

So much for that phase of the topic for discussion -- now to get into some of the things that can be done to stretch the available dollars.

Many regions have had extreme pressure placed on unit managers during the war years. Special programs, increased timber sale activity, the grazing controversy, winter sports, big game problems, changes in special use charge procedures, dam building activity, flood control, basin plans; -- this list could go on and on but this sufficient to make my point. This increase in activity has combined in at least some of the western regions with a rapid turnover in personnel with many new personnel entering the Service and a series of less than average fire years, to reduce the time and attention given to fire control activities and to weaken the fire organization.

TOPIC 10 - USE OF COOPERATORS TO INCREASE STRENGTH OF INITIAL ACTION ON FIRES

(Olliver Chairman)

Discussion Summary

The purpose in including this topic in the program was to illustrate the extent to which cooperator initial attack can be developed.

In past years many sections of the west had a much more highly developed cooperator system than now exists. Interest and cooperation in fire detection and suppression, on the part of residents and users inside and adjacent to the National Forest, in many areas died out due to non-use. This disuse was brought about to a large extent by the availability and use for initial attack of large forces of CCC, or other emergency workers, and in the 1940's the CPS, project crews, etc. General speaking we have been slow in building back this previous fire cooperation, altho it is still a strong factor in Region 2.

In some areas good progress has been made in revitalizing cooperator aid, notably in portions of Utah and Montana. Even so, it was agreed that we could go much further than we have.

The type of cooperation discussed should not be confused with our arrangements for fire fighting forces for large fires with lumbering, construction, other industrial concerns or with the Military or other protection agencies. Such arrangements have been developed to a high degree in most localities where industry etc. exists. It is the prompt trained cooperative initial attack that needs to be revitalized.

Obviously (as discussed under "How to get more out of our protection dollar") dependable, trained prearranged cooperators can materially increase our initial attack strength, or will permit a forest to rearrange its paid seasonal forces to get initial attack coverage of added territory.

Cooperators by their very interest and cooperation in the fire venture will develop a sense of fire responsibility and become powerful fire prevention agents, influencing their families, neighbors and friends. Voluntary detection and reporting of fires will also be a natural outcome of this cooperation.

Paper by Olliver follows:

USE OF COOPERATORS TO INCREASE STRENGTH OF INITIAL ACTION ON FIRES

(Olliver)

There are no full-time regular personnel charged to fire P&M in R-7.

All action on initial attack, necessary reinforcement and handling of complete fire suppression job is done through the use of cooperators. Through the use of cooperators we have available people to help check as to a reported smoke. Checking may or may not cost anything. If the person is in position to see the area no time in involved and no cost. Checking may mean travel and time to check the smoke and so the individual may or may not submit a bill for mileage, or wage payment or both.

When a fire is reported, a warden crew, high school, college, sawmill logging or other available fire crews make the attack on the fire. Who we send depends on size of crew needed. The warden crew may be 2-4 men while others are made up a greater number of men. The warden will follow up to relieve these other crews. Forest Service work crews are also available but are considered the same as cooperator crews.

The ranger or a member of the ranger district office will follow up on whatever crew or crews may be sent. This does not mean that we follow up on all crews. Wardens through training and experience develop into dependable fire control men and can be depended on to do a good job.

Training is provided to these crews at least once a year. The training may complete training on fire control to care for new men and follow up for men having had previous training. With the warden he is trained and he, in turn, gives training to his men.

We also have cooperators in the supplying of tools and equipments, such as trucks, tractors, bulldozers, tankers, pumps, and so on. We have little equipment charged 100% to fire. At present it is limited to tank trucks and pumps.

There is cooperation with the states in which national forests are located. An example is the cooperative agreement with Pennsylvania. The dispatcher and warden crews are the state's. We pay for suppression action when the fire is on national forest land.

Cooperators are also a source of help with our prevention program. Warden and crews who have to fight the fires generally do a certain amount of talking against fires.

There is one thing in our cooperative program with the states that causes considerable concern. The wages we pay are generally more than the states consider advisable to pay to wardens and crew members.

TOPIC 11 - FIRE BEHAVIOR AND HOW TO IMPROVE OUR KNOWLEDGE OF WHAT TO EXPECT.

(Buck-Jefferson-Chairmen)

In addition to the points made in the Committee Recommendations and the outline for presentation of this topic, the following points developed in discussion were made.

1. We need to increase our knowledge of fire behavior particularly to get better suppression work done.

2. Knowledge of fire behavior is absolutely essential to adequate suppression planning and action. It is also needed in other phases of fire control.

3. "Old-timers" gained the necessary knowledge and experience in fire behavior to do a good suppression job through the trial and error method, built up through years of experience in fighting many fires. This process is too slow and too inefficient to give all our new men this knowledge and to improve upon it. We need to codify what our old-timers have learned and to keep on developing new guides. The old-timers are disappearing so rapidly due to retirement, etc., that action is urgent to maintain even our former standards.

4. Fire control managers from the ground up need more basic material for training men in fire behavior, as well as to guide the fire boss in anticipating what a fire will do so that he can carry on a safe operation.

5. New men are not acquiring as rapidly as they should, the needed and available knowledge of fire behavior required to do an acceptable suppression and fire control management job. This is due to several causes:

   a. Pressure of other activities reduces time spent on fire assignments.
   b. Specialization on overhead fire jobs curtails opportunities for on-the-line experience.
   c. Insufficient training - in fundamentals and on the ground - more training details needed on both small and large fires. To augment training possibilities it may be necessary to plan, on forest, off forest and out of region, training details to an increased extent.
   d. Lack of availability of simple, easy to grasp digests of research findings, both old and current, properly codified for both training and use on fires.

c. Non-availability of the experience findings of old-timers, translated into readily usable reference material for training and actual use.

f. Although used to some extent, full use is not being made of training aids such as fire problems using aerial photos, past fires, etc. This is an aid - not a substitute for on-the-line training and experience.

6. These deficiencies need to be recognized and remedied if acceptable suppression action is to be attained or even present levels of efficiency retained. Material aid in applying remedies needed could be afforded through:

a. Codifying knowledge of fire behavior available from experience of old-timers.

b. Making available present and future basic research findings in fire behavior, currently in simple, easily understandable form. It is necessary to overcome the traditional research attitude to await dissemination of information until the final answer is obtained - approximations will serve but they are needed currently, and existing unwritten findings should be issued. Need not await Department, technical or professional publication but could and should be put out as research notes or published in Fire Control Notes.

c. Provide time for training, plan it according to need and carry it out.

7. The emotional effects of fire suppression are reduced when adequate knowledge of just what the fire can be expected to do, is possessed by the Fire Boss. The result is cooler actions and decisions, sounder judgment, and less wear and tear on the fire man.

8. More things are known about fire behavior than are common knowledge or available in written form for reference. However, the complexity of inter-relationships of the factors affecting fire behavior leaves many facts yet to be determined. There is still much work to be done in fundamental fire research. Such work should be a continuing project.

9. Knowing the fundamentals of normal behavior of fires does not meet all our needs. We need to know what makes fires "misbehave" or how to recognize combinations of conditions which lead to "blow ups" or unexpected fire behavior. This is essential for safety of our men as well as for planning for control. Suggestions as to methods of getting a start on this phase of fire control include - for both administration and research :

a. Recognize we do not have to wait for the full answers to be found. We can prepare usable guides now based on past experience.
b. Collect and codify observations of experienced fire men.
c. Refer to case histories of such fires and record the distinctive conditions indentifiable with "blow ups".
d. Analyze fires after they occur to identify to the extent possible what caused them to do the unexpected. This will not provide a full answer but our store of knowledge will be added to.
e. Administrators should seek the advice of research to determine the data to be observed, collected and appraised.
f. In speaking of "blow ups" the term should be limited to unusual or unexpected rapid rate of spread, in order that all will be thinking along the same lines.

.0. It was generally agreed that an aggressive program of fire research and prompt release of results were real needs of the fire administrator.

FIRE BEHAVIOR - HOW TO IMPROVE OUR KNOWLEDGE

Buck

I. WHY DO WE WANT TO INCREASE OUR KNOWLEDGE?
   a. To permit better planning of suppression job.
   b. " " " " of presuppression activities.
   c. " " " " of prevention activities.
   d. " " " use of fire.
   e. " " " estimates of potential damage.
   f. " " greater safety of men in the woods.

II. ARE THE ABOVE UNIVERSALLY RECOGNIZED?

III. HOW IMPORTANT ARE THE ABOVE TO FIRE CONTROL?
(Suppression strategy probably on decline - experience is less, technical knowledge not replacing it entirely.)

IV. FIRE BEHAVIOR IS A HIGHLY TECHNICAL COMPLEX PHENOMENON. HAVE TO RECOGNIZE THAT:
   a. Complex relationships can be described in simple language.
   b. The relationship itself is still complex.
   c. Problem particularly difficult in suppression because of time element and size of evaluation job.
   d. Probably never can raise all fire goers to a fully proficient level.

V. THERE IS NO MAGIC IN FIRE.
   a. Fire has psychological effects on people. Effects deterrent to good action can be dispelled by confidence built on knowledge.
   b. Fire is a physical process that responds to its environment.
   c. Variations in fire behavior can be understood:
      (1) Requires recognition and measurement of the controlling factors of environment.
      (2) Requires correlation between environment and behavior.
   d. Research is required for both (1) and (2).

VI. WHAT ARE THE MECHANICS OF THE JOB?
Experience has shown us three approaches to the problem that have led to practical results. There may be others.
   a. Theoretical research
   b. Controlled experiments
   c. Field measurements
      (1) Selected conditions
      (2) On uncontrolled wild fires

VII. WE KNOW HOW TO DO THESE THINGS.

We do not have the manpower and funds to permit appreciable progress.

VIII. THERE IS STILL A LARGE QUESTION OF TRAINING.

a. Recognize limitations of short term personnel.

b. Learn how to train those who could benefit.

TOPIC 12 - ROLE OF FIRE RESEARCH (Mitchell-Chairman)
TOPIC 13 - FIRE RESEARCH FINANCES (Buck-Chairman)

These two topics were treated by the group as one.

The following outline was presented as the basis for starting discussion of Topic 12.

1. Kinds of Research Service

   a. New facts from exploring the unknown.
      (Fundamental Research)
   b. New applications, systems or methods developed from known facts and principles.
      (Applied Research)
   c. New adaptations of accepted application of facts to new conditions or larger areas.
      (Pilot Plant Studies)
   d. Informal Research -- discovery and invention, from skillful use of observation and experience.
      (Administrative and Empirical Studies)
   e. Putting known facts, new methods, and new applications into the hands of users.
      (Extension)

2. In discussing the desirable extent to which fire research should go in the various types of service listed in the outline, it was found that the work to be undertaken cannot be considered independently of the availability of time and funds. Therefore, there was considerable overlap with Topic 13 in the discussions. Consequently, the following paragraphs cover the discussion of both topics 12 and 13.

3. The type of research to be undertaken depends on an analysis of the following factors and arriving at a reasonably balanced fire research program for an individual station.

   Factors to be analyzed

   a. Unanswered questions.
   b. Values at stake dependent on research information and the determination of priorities.
   c. Desirability of getting ahead of field demands.
   d. Cost in time or money of proposed projects.
   e. Money and manpower available.
   f. Contributions, if any, by administration.

4. The question was posed, "With present funds and facilities should we limit fire research to basic studies only, focus on pressing problems, or on getting research results into use, or try to cover the whole field?" The dilemma appeared to be that we can not limit research to any one of these classes, if a program rather than a project is needed. But that it is necessary to carry on some of each class with the suggestion that annually programs be weighed and adjusted through the help of an advisory council to make sure the Service is in good balance.

5. Members of the group again called attention to the disproportionately small funds and facilities made available for fire research in comparison to the other fields of research, particularly when the basic need and size of the administrative fire control enterprise is given recognition. The program of the Southern Station with its 79 people, only one of whom is assigned to fire research was cited as an example.

a. This situation might call for redistribution of currently available funds to permit increased fire research but
b. Preferably, it was agreed that additional funds should be obtained for fire research. Although Research as a whole has received large increases recently, very little of this has been made available to fire research. This signifies that we are just not selling our own personnel on the need of fire research to our own organization. We have a selling job to do. To what extent is this lack of recognition due to the fact that findings have not been gotten out in the open and used? Findings must be put out promptly.
c. Business and industry, generally speaking, provide around 5% of their operation costs for research. On the basis of Forest Service fire control expenditures alone about 0.9% was provided in F.Y. 1950 for fire research.
d. Recognizing that other protection agencies look to the Forest Service as the responsible agency for fire research and that the Forest Service fire research budget is less than 3/10 of one percent of the $42-50,000,000 annual nation-wide forest fire fighting cost of all agencies and only slightly over 1/10 of one percent of the total bill including losses, it seems evident that more fire research funds would be in the interest of good business management.

6. Because of the lack of service, various protection agencies are endeavoring to start fire research work of their own, and a few states have fire research budgets. We should explore the possibility of working with agencies that are now initiating fire research with the purpose of avoiding duplication of work and of insuring that the effort is devoted to the more important problems.

Paper by Mitchell follows:

THE ROLE OF FIRE RESEARCH

Mitchell

There are two schools of thought in regard to the role of Fire Control Research. One concept is that funds appropriated for fire control should be used exclusively for administrative purposes and that research and technical services should be provided by the Branch of Research. The other is that Fire Control funds should cover the technical services needed to do the job, and that the efforts and resources of Research should be concentrated on basic studies aimed at developing underlying principles and relationships.

The need for studies to solve current administrative problems is recognized and should be provided for. There remains, however, a vital need for basic research to provide a sound foundation for administrative policy and action. With the limited funds at its disposal the Division of Fire Research cannot do justice to both.

Two solutions are possible: One is to provide Research with sufficient funds for both activities. The other is to use research funds for basic fire studies and to finance administrative studies and technical services out of administrative funds.

Without a material increase in the research appropriation the latter would seem to be the logical policy. Certainly technical services are a legitimate administrative expense.

No modern, progressive business organization operates without providing for its technical needs. Certainly no enterprise as important and involving such large expenditures as fire control can afford not to devote a reasonable part of its resources to research, technical services, and the development of new and improved methods. The allocation of five percent or more of their resources to research is considered good business in many lines. How much is spent for fire research?

The total expended annually for fire control in the United States is in the neighborhood of $42,000,000. The 1950 allotment for fire-control research is $122,765, or about 3/10 of one percent. On the basis of Forest Service fire control expenditures alone, the proportion is 1.2 percent (in Region 9, 1.07 percent).

The argument that fire-control funds should be used exclusively for fire suppression, equipment, and administrative expenses is short-sighted. Doubtless more money could be used to good advantage for these purposes, but results depend more on doing the right thing, in the right way, at the right time, than on a few extra tractors or guards. In the past it has been much easier to wrangle an extra bulldozer or two than to get the instruments and observations needed to provide an adequate guide for effective action.

It is recognized that contributions have been made by administration for fire research. The fact remains, however, that such contributions are not universally recognized as legitimate and desirable, or provided as a matter of established policy. The contention that fire-control funds are appropriated exclusively for administrative purposes is debatable. If so, the appropriations for fire control and for fire research are sadly out of balance.

So much for the present situation. Disregarding how research is financed, just what is the role of the fire-research organization and what is needed to enable it to function effectively and to best serve the interest of fire control?

There is no question in my mind that its primary function is basic research. To know when, where, and how fires burn is not enough. To effectively meet the challenge of forest fires we must be able to recognize and evaluate the various factors that influence fire occurrence and behavior and affect their control. Little progress was made in rating burning conditions, for example, until the significance of fuel moisture was established and its relation to weather and other conditions determined. There is need for similar basic information in regard to risk, hazard, control methods, and fire effects. For example, we have been trying to classify fuel types without any very clear conception or definite knowledge of the basic factors which determine hazard. Even less progress has been made in a satisfactory evaluation of risk, control methods, and fire effects, and the whole field of fire economics remains practically unexplored.

These, it seems to me, are the problems with which fire research should be chiefly concerned and on which it should expend its major efforts. Short-time studies to meet specific current administrative needs, the analysis of fire statistics, and technical assistance in putting research results into effect should be provided for, but are primarily an administrative responsibility.

Whether Administration should take over these activities or allocate funds to Research to finance them is a matter of policy. The latter course, however, would seem to be the more productive, since it would insure close contact between Research and Administration and give research men the practical background needed to make fire research useful.

In the past, fire research has been handicapped by lack of coordination and contact between the men working in this field. The appointment of Mr. Brown to head up fire research in Washington should help materially. There is still need, however, for fire-research men to get together periodically to exchange ideas and to clarify their thinking, for, while conditions vary between regions, the underlying principles involved are universal.

To get the best results at least two men on fire research are needed at each Station, and three if administrative needs are to be given attention; for a man working alone is at a distinct disadvantage. Not only is too much of his time taken up by routine matters, but the lack of someone with whom to discuss technical problems is a serious drawback to clear and objective thinking.

To summarize, I submit:

1. That fire-research funds should be used primarily for basic studies.

2. That administrative studies and necessary technical services should be financed by administration.

3. That to get the most out of fire research, basic studies should be correlated, fire-research men should be brought together periodically, and a minimum of two men should be assigned to every Station doing basic fire research.

TOPIC 13 - FIRE RESEARCH FINANCES

Buck

We are all agreed that fire research does not have the funds to do the things we think need to be done. The problem of getting needed increases is a serious one that confronts all of us.

Fire research as a national need has not been sold. One way it might be sold is through the use of more spectacular selling aids. In our discussion let us explore some of the possible approaches and consider some of the kinds of things to do that will help sell our program and its products. (See also page 52 which unavoidably included much of this subject.)

TOPIC 14 - ANALYSIS OF FIRE EXPERIENCE AS THE CRITERION TO WELL-BALANCED FIRE CONTROL SYSTEM
(Barrows-Chairman)

Notes from presentation and group discussion of topic:

The Region 1 method of fire control planning being used in current revision of the 1930 plans was presented to illustrate the factors which must be considered in planning. Data was obtained from 929 analysis, or past fire experience plus several special factors listed in the paper presented - (See page 58).

The paper is very complete and there is no need of repetition here. Principles and factors which must be considered are detailed. They were also presented in chart form.

The following were the highlights of the discussion:

1. The methods of planning described involved use of the engineering approach - a formula basis. Mention was made of the fact that there also have to be some judgment determinations in such planning.

2. The 929 is an invaluable and in fact the only source of information that can supply a sound basis for fire planning. This fact should be emphasized to field men in an attempt to have all entries as accurate and complete as possible.

3. Some question was raised as to whether rate of perimeter increase or rate of forward spread should be used in determining the size of the suppression job. Where it is possible to "head" a fire the rate of forward spread is an important concept. In locations or fuel types where the fire has to be fought on all sectors at one time the rate of perimeter increase is important.

4. In setting up value ratings to serve as one of a number of guides for station placement the inclusion of potential cost of protection is very important.

5. It should be kept in mind that fire planning is for initial attack and prompt reinforcement action aimed at catching fires reasonably small rather than planning for control of project size fires.

6. An important observation was that unless fire plans are kept up to date they are of doubtful value in many respects.

7. There was a general expression of the desire to have copies of the Fire Control Planning charts, showing the inter-relation and proposed integration of the various factors involved in fire planning. Mr. Barrows agreed to have smaller reproductions of the charts prepared and sent to all Regions and Stations for reference purposes.

Paper by Barrows follows:

ANALYSIS OF FIRE EXPERIENCE AS THE CRITERION TO WELL BALANCED FIRE CONTROL SYSTEMS

Barrows

Foreword

To open up this topic and to stimulate discussion, I am going to give a brief review of our current project at the Northern Rocky Mountain Station in the field of fire control planning research. In tackling this job we are using the time-honored method of analyzing past fire experience to obtain information needed in establishing principles and techniques for the design of fire control systems.

A brief history of past work in this field may help in orienting our discussion. From 1930 to 1936 Lloyd Hornby undertook a major project in fire control planning research. As we all know, he pioneered many highly successful techniques -- fuel type classification, systems for determining detection and smokechaser coverage, reinforcement and requirements, etc. In the 14 years that have elapsed since Hornby completed his work, fire control has gone through the greatest period of change in the history of organized protection. Fire danger rating has been developed to a high state of usefulness, smokejumping has become a common method of suppression action, aerial detection has been developed as a team mate for the fixed lookout stations, aerial delivery of men and equipment has been greatly expanded, and mechanized attack has been improved and extended over a much greater area.

In addition, in Region One we are experiencing a huge change in our timber economy with major harvesting projects now underway in areas formerly considered inaccessible back country. As a result of these evolutions our former methods of fire control planning are obsolete.

I do not wish to infer from the foregoing that our fire control machine is still designed on the basis of obsolete methods of planning. Nothing could be further from the truth. The Region has been alert in the development of new methods of attacking the problem. Fire control planners in both the regional and forest levels have been quick in adopting necessary changes. The general attitude of the administrative forces has been one of boldness in forging ahead. But the fact that such sweeping changes have been made does not obviate the need for fire control planning research. On the contrary, the need for coordinating the application of both old and new control methods is greater than ever before.

Objectives

The systematic design of protection systems requires that the planners be equipped with basic knowledge in three broad areas of fire control science:

1. The occurrence and behavior of fires.
2. The capabilities and efficiency of various control forces.
3. The rating of values of the resources to be protected.

Our first objective in fire control planning research is to attempt to satisfy these requirements. Once this preliminary objective is achieved, we are ready to proceed to the end objective of fire control planning research which might be stated as follows:

> "To determine the principles and techniques required in designing fire control forces of the type, strength, and location that will yield adequate protection at least possible cost."

In discussing the above objectives we are often asked whether our end results are pointed primarily to long-range planning or if we are also attempting to provide guides that will be useful to dispatchers and fire bosses in planning the control of going fires. Our answer is that we hope to aid in both long-and short-range fire control planning. The two fields cannot be totally separated. For example, what we may learn about rate of spread by fuel type and burning index is information needed by the man planning a detection system for a forest as well as the man planning the suppression of a going fire.

Methods

Our approach to this project has been from the engineering viewpoint. We believe that the first need is to provide a series of tables and charts which will show the best available information on such things as data and hour of occurrence of lightening fires, chains of fire perimeter per hour according to fuel type and burning index, distribution of fires by elevation zones, etc. Engineers require similar information before they can design a structure. For example, the bridge engineer doesn't say "I guess that 12-inch girders will be strong enough." Instead he refers to appropriate strength-of-material tables, and from the information there he makes calculations of the loads and stresses. We want to do the same thing for fire control planning. The research methods that we are using are aimed at providing as much of this type of information as possible.

Our primary source of information has been the individual fire report. During the past two years we have analyzed 35,000 fire reports -- 24,000 of these being for fires handled by the Forest Service and some 11,000 being for fires handled by other agencies including the National Park Service, the Indian Service, state forestry departments, and the private fire protection associations.

In using individual fire reports as a primary source of information, we have recognized certain advantages and disadvantages. We all know that these reports contain some inaccurate statements and figures. On the other hand, they have given us a very large sample of the fire problem in the region at a relatively low cost. On many of the factors studied the individual fire reports have provided the only source of information. On other factors, such as studies of rate of spread, we would have to set hundreds of test fires in the field to approach the level of information obtainable from thousands of coded fire reports.

Our methods of analysis may be of interest. (Show chart No. 1) As shown on the chart, we have classified the study into four major factors with several subdivisions under each of these, as follows:

I. General Factors
   - Fire Occurrence
   - Fire Damage

II. Behavior Factors
   - Fuels
   - Climate
   - Topography

III. Control Factors
   - Prevention
   - Detection
   - Communication
   - Transportation
   - Initial Attack
   - Reinforcement Action

IV. Special Factors
   - Suppression Methods
   - Service of Supply
   - Effect of Grazing
   - Effect of Timber Harvesting
   - Value Classification

In the short time available for this subject I can give you only a very brief glimpse of the nature of the information that has been obtained. However, a few of the highlights may be of interest.

1. Fire Occurrence -- Regional loads of 50 or more lightning fires in one day occur in every month from May through September. Such loads have occurred 76 times in 15 years. The least dangerous period of lightning occurrence is 10 a.m. to noon; the most dangerous, 4 to 6 p.m. We have three well defined zones in Region One in which lightning patterns are significantly different.

2. Fire Damage -- Over 94 percent of the area burned has resulted from less than one percent of the fire. We have burned 6-3/4 million acres in 40 years. Over 86 percent of the burn has occurred in 7 critically dry years. In the western zone of Region One we have burned more than one-tenth of one percent of the area protected in 5 years out of the last 20; in the eastern zone, in only one year. Grand fir is our worst trouble-maker. We have burned 60 percent of that type in 25 years.

3. Fuels -- Our previous Region One standards stated that rate of spread at a burning index of 70 would vary from 6 chains per hour to 20 chains for extreme fuels. We have found that this variation actually runs from 9 to 120 chains per hour. In addition, we are now able to show the change in rate of spread for all fuels according to burning index. In the process of doing this we found that we have 5 rate-of-spread types rather than the 4 formerly classified. The new class is in grass fuels.

4. Topography -- 48 percent of our fires occur at elevations of over 5,000 feet. Our lightning load per million acres average 74 fires in the elevation zone between 5,000 and 6,000 feet. However, in our worst lightning area this average is 177 fires per million acres at this elevation. Fifty-five percent of our Class E fires occur on south or southwest slopes.

5. Detection -- 54 percent of our fires are detected by lookouts at a cost of approximately $1,000 per fire. Lookouts detect 82 percent of the lightning fires and 48 percent of the man-caused fires occurring in their seen area.

6. Initial Attack -- 74.7 percent of our fires are handled by initial attack forces. Over 90 percent of the fires controlled in the first burning period are held to Class A size. We are making a comprehensive study of smokejumper use in initial attack.

7. Reinforcement Action -- 25.3 percent of our fires require reinforcement action. We have found that the second burning period is a critical time for fires that escape initial attack. If these fires reach 100 acres in size, the odds are about 60-40 that the fire will reach Class E size. The average burn, in fact, for these fires is 3,700 acres.

8. Suppression Methods -- Hand-tool firefighting remains a critical problem with relatively low output of held line still existing. In spite of heavy manning we made some of our best records during CCC days. Our man-hour load to control averages 62 hours per fire and runs as high as 231 hours in the cedar-hemlock type. We haven't been able to meet the standards of line production established by Hornby. For example, in medium-resistance-to-control fuels our standard is 2 chains per man hour. Our actual production in this fuel is only 0.36 chains.

9. Effect of Timber Harvesting -- Timber cutting definitely increases the fuel classification. Nine percent of our fires occurring on cut-over lands reach Class E size, as compared to only 3 percent in green forests.

Basic Principles

The foregoing are a few examples of the type of information being obtained from the analyses of fire experience. Armed with these data we have proceeded into the next phases of the study. First of all, we have attempted to set forth the basic principles that should guide fire control planning. They are as follows: (Show chart No. 2.)

1. Plan for the worst - first. In the design of fire control systems the first step is to identify those conditions which will cause the greatest damage to forest resources. Such conditions include combinations of weather and fuels which will cause fires to start easily, spread rapidly, and become difficult to control. Adherence to this principle establishes a system of priorities for both prevention and control action and in turn enables more positive identification of threatening fires. In practice this principle serves as the guide to the location of the most needed detection systems, roads, trails, and suppression forces and to the type and strength of those forces. This principle also simplifies the process of fire control planning because by taking care of the worst first many of the lesser priorities are automatically handled.

2. The degree of fire control action must be commensurate with the values at stake. This principle, like the one above, carries forth the idea that the most important things require the first and greatest attention. In this case more intensive fire control action is planned in the areas of the greatest value, provided of course that such action is warranted by the fire danger. Likewise, the principle carries forth the policy of holding burned area to lower levels as values increase.

3. Fire prevention is fundamental to successful fire control. The removal or reduction of fire causatives increases the chances for successful control of those fires that remain non-preventable. Fire prevention is the most positive of all means of control. The realization of fire control objectives based upon suppression action alone involves many risks. Prevention must therefore by planned and applied aggressively if for no other reason than to enhance the actuarial odds on the over-all fire control program.

4. Fire control requirements must be adjusted in accordance with three major variables -- fuels, weather, and occurrence of fires. To insure successful suppression action and to hold costs within acceptable limits it is essential that these three factors be identified, measured, interpreted, and then acted upon according to the degree of total fire danger that they spell out.

5. Fire control lines must be built and held faster than the fire makes perimeter. This was Hornby's first and most basic principle of fire control planning. In application the principle means that the speed of detecting, reporting, dispatching, traveling, and suppressing must be directly correlated with the calculated rate at which the fire will increase in perimeter. In particular this principle means that methods must be devised of adjusting the type and strength of suppression forces in accordance with the rate of spread of various fuels under various weather conditions and the resistance to control presented by those conditions.

6. Fire control plans must provide for uniform action by all forces under similar conditions. This is one of the basic reasons for systematic fire control planning. To illustrate: If there is good reason for one forest to have detection on 80 percent of its high-high fuels under a burning index of 70, then there is an equally good reason that another forest meet the same standards under the same conditions. Once sound reasons have been determined for a given level of action, the fire control planning methods must provide for a uniform application of the required standards. Otherwise, there can be no assurance of proper expenditure of funds nor an adequate degree of fire protection.

Fire Control Planning Techniques

Analysis of our control job naturally points to the need of certain techniques for fire control planning. (Show chart No. 3.) The techniques as listed on this chart do not constitute a complete list. I have purposely omitted many of them because the short time allotted to this subject does not permit discussion of all of them. Many of the techniques as listed are old and well established. Others are new to fire control planning.

The sequence of the application of these techniques is as follows:

1. Major fire behavior factors are measured.
2. Capabilities of control forces are evaluated.
3. Control requirements are determined.
4. Values are rated.

This appears to be a logical approach to an action program in fire control planning. First, we measure and rate the major factors of fire behavior. This tells the general nature of the fires that we must control. It is aimed primarily at indicating how fast these fires will gain in perimeter under various fuel and weather conditions.

The second job is to evaluate the capabilities of our control forces. We want to know as specifically as possible what they can and cannot do. This means tables showing efficiency and coverage of detectors, hold line by smokechasers, gallons of water per chain by tankers in various fuel types, chains per hour by bulldozers, getaway time for smokejumpers and aircraft, etc.

The next job is to determine over-all control requirements. This means integration of behavior and control factors. The primary basis of this technique is the hour control standard as shown above. Seasonal flexibility is achieved by the danger rating system. The final instrument spelling out requirements is a set of manning and equipment tables somewhat similar to our present Region One Table X.

The final step is to rate values. From the above procedures we have determined requirements based solely on the behavior of fires and the over-all fire load irrespective of the values involved. This is a sound procedure and adheres to our principle of planning for the worst first. But we must have some basis for adjusting such plans as necessary in accordance with the values at stake.

Some of the techniques as outlined on the chart are new and may be of interest. The fuel type classification and mapping system, as proposed, is divided into two parts. The first is a fuel type map generally similar to our present one except that type descriptions are to be revised. The second map rates fuel classification on large areas. Because of the mobility of present fire control organizations, it is not practical to attempt to distribute men and machines on the basis of small fuel type units. We need composite ratings showing the fuel classification for whole drainages. Application of this new technique of fuel classification would call for the establishment of fire control units somewhat similar to our timber management working circles. With such areas given composite fuel ratings, we should be in a better position to plan the type, strength, and location of control forces.

The technique of applying weather factors to fire control planning is a well accepted practice. Based upon analyses of fires according to burning index and also upon a separate 15-year study of seasonal fire danger we are now able to:

1. More clearly define easy, normal, and critical conditions in the major zones of the region.

2. Simplify our interpretation of the effects of burning index ratings.

3. Show probabilities of the number of days in each burning index class.

The correlation of burning index and fuel ratings is one of the most important phases of fire control planning. We have devoted more time to this than any other phase of the work. Based upon these studies we hope to make the following contributions:

1. A series of tables for fire control planners showing rate of spread by fuel type and burning index.

2. A rate of spread calculator for field use.

3. Hour control standards for each fuel type and major burning index class. Also a table of hour control standards for use with composite fuel ratings on large areas.

Evaluating the capabilities of control forces requires the application of many well established techniques as well as several new ones, including the following:

1. A system of rating and mapping seen areas for planned aerial patrol routes.

2. New silhouette showing coverage by all means of air and ground transportation. These are based upon travel time studies.

3. Tables showing hold-line output by men and machines in all major fuel and topographic types.

TOPIC 15 - FIRE DAMAGE APPRAISAL PROJECT IN CALIFORNIA
(Buck-Chairman)

Notes from presentation and group discussion:

1. The presentation of Southern California damage appraisal techniques was included in the program to illustrate the possibility of setting up a reasonable basis for determination of one of the less tangible damages that result from fire and to present the methodology used.

2. The methods and results described were those applying to the four Southern California forests of Region 5. The watersheds of these forests are particularly important because of the high value of water in this heavily used semi-arid locality and the high damage potential that can be expected due to normally adverse fire weather conditions, steep topography, flashy fuels, high risk and long fire season.

3. The above considerations and the fact that former empirical damage figures had been found entirely inadequate, justified the time consuming job of collecting and integrating the data for the 275 designated drainage basins in this section. (Basin areas running from 800 acres to several hundred square miles depending on the importance of the watershed).

4. Several basic considerations were applied in working up the tables of damage to be used in fire damage appraisal. They are:

   a. Recognition that the watershed damage resulting from a burned area extends itself to downstream areas, some at considerable distances from burn. This damage results from accelerated run-off (floods) and erosion, involving silting of reservoirs and irrigation works, increased cost of road maintenance, cost of removal of debris from streets and developed areas and similar damages. The actual value of improvements destroyed is in addition to the above.

   b. The cover in this area does not fully reclothe the ground for about 70 years. Therefore, the damage resulting from expected storms of destructive intensity can be expected to continue in future years. Since the time of occurrence of storms of this intensity cannot be forecast the damage to be expected was spread evenly over the 70 years period. The cover itself has value only to the extent that its removal (by the fire) causes an economic loss, through destruction of its beneficial influence in increasing usable water supply and in preventing floods and erosion.

c. Fire damage resulting per acre of burn varies with total area of the fire and location within the watershed. For example, a 10-acre fire may result in no watershed damage, a 200 acre fire may mean a given damage, a 1,000 acre fire may cause additional kinds of damage and a 3,000 acre fire, still other damages. The result is an increasing per acre loss as the size of the burn increases.

5. The values developed and the identical methodology are applicable only in this Southern California area. However, ideas may be obtained from study of the methods used in this project, for use in developing watershed damage tables for other localities. Plans contemplate extension of this type of project to the remaining portion of Region 5. A start on this will be made in 1950. The experience gained in the Southern California study will be useful in developing a methodology adapted to more kinds of values and to the different conditions in Northern California.

6. The results of the Southern California study appear in one general pamphlet explaining concepts, principles and general methods, plus a pamphlet of damage value tables and maps for each of the four Southern California forests. These pamphlets were distributed in 1949 to all Regions and Experiment Stations. If extra copies of the material are desired or answers to specific questions needed, the Division of Fire Research, California Forest Experiment Station should be contacted.

Committee Recommendations:

1. No specific committee recommendations for this topic were presented since the principal purpose was informational.

2. However, general interest was evidenced and the need and desire were expressed for the undertaking of similar work in other parts of the United States.

Note: The 1949 pamphlets distributed last year by the California Forest Experiment Station to all Stations and Regions supply a reference for review of general methods and principles employed in the California Fire Damage Appraisal Project.

No formal paper presented.

TOPIC 16 - USE AND ACCURACY OF FIRE WEATHER FORECASTS IN FIRE DANGER RATINGS

(Morris-Chairman)

Notes from presentation and discussion of group:

1. Wind is one of the most important, if not the most important factor affecting fire danger and is probably the least accurately forecast. Additional work with the Weather Bureau and providing its Fire Weather Service with results of our checks on accuracy of the wind forecasts (as well as other factors) is certain to result in further improvement. This is actually giving backing to the Weather Bureau in its efforts to improve its service.

2. It is possible we may expect increased accuracy of forecasts on the West Coast due to three additional weather station ships being stationed in the Pacific recently.

3. Greater and greater importance of Fire Weather Forecasts for guidance of Fire Management is due to increasing use of fire danger ratings for day to day fire management as well as in fire suppression.

4. Need for longer range Fire Weather Forecasts in the fall in some locations is of great importance because of the urgent need to guide fall slash disposal activities for several days after fires are set out.

Paper by Morris follows:

Outline of Topic Presentation on
USE AND ACCURACY OF FIRE WEATHER FORECASTS IN FIRE DANGER RATING

Morris

I. Background

A. Intended use of fire danger rating in 1936 in R-6

1. Give the Regional Forester a measure of need on each forest for protection manpower compared to other forests for the average year as a whole.

2. Give a measure of need for protection manpower on a given forest in early and late season as compared to mid-season.

B. Design of fire danger rating system.

1. Rated for the worst part of day.

2. Rated burning conditions that vary with weather or fuel moisture and wind.

3. Rated visibility which varies day to day with weather and smoke.

4. Rated risk or activity of fire starting agencies.

5. Today's and previous days' ratings to show the trend in fire danger as season progressed, and average for entire season to show the average danger affecting the fire control load.

C. Use

1. Use was mandatory after two years of trial and all districts soon depended on it.

2. Plans for use of lookouts and smoke chasers and extra prevention steps based on ratings.

3. As presuppression organization was made more flexible, following increase in roads, more timber management personnel, more use of suppression crews, and more logging crews available for cooperation there was more day-to-day shifting of presuppression force according to fire danger so as to do other work when safe.

4. Forty-hour week caused still more shifting and granting leave according to fire danger.

D. In recent years numerous forests recognized that too often they overmanned because of a high fire danger yesterday caused by high wind that was low today.

1. Some suggested eliminating wind. Some suggested use of forecast wind as more representative.

2. Decided to try individual district forecast of wind on two districts as experiment to replace the usual broader area forecast which covers one or more forests. Local dispatcher was to apply local correction factors for topography. Result not very good. Local correction factors improperly applied.

3. Supervisor's staff fire assistants decided at regional meeting last January to estimate tomorrow's wind and fuel moisture each evening using fire weather forecast and local knowledge of winds for each of the 3-5 stations usually used on each district. Our districts divided into several zones of comparable fuel moisture determined largely by elevation differences. The fire danger rating done separately by zone.

4. The fire assistants delegated the Experiment Station to provide some rules of thumb for local correction of Weather Bureau's forecasts.

II. New system used in 1949

A. Forecasts from Weather Bureau

1. 8:00 p.m. and 8:00 a.m.
2. By broad areas of about 50-75 miles or more in extent.
3. Wind in miles and direction, relative humidity in percent, temperature in degrees, clouds in tenths, lightning storms in percent of probability.

B. Local aids

1. Personal knowledge
2. General rules such as:
   a. Less wind in valleys when direction is across the drainage. Up and down valley effects.

b. More dew in valley when calm and temperature inversion. East wind effects at high and low elevations. Sun effects. Half-inch fuel moisture sticks show one percent change with five percent relative humidity change.
c. Poor visibility when temperature inversion or light wind from direction of cities or big fires.

3. Average expectancy based on local records of previous years.

a. Most likely winds of various direction and velocity for each observation time. Our observations taken at 8:00 a.m., 12:00 noon, and 4:30 p.m.
b. For stations at which records show winds frequently more than 6 miles per hour. Most probable 4:30 velocity for each direction and velocity at 8:30 a.m. Most probable 4:30 velocity for each forecast direction and velocity.
c. Next afternoon's 4:30 fuel moisture based on current afternoon fuel moisture and evening forecast of relative humidity for next day.
d. 4:30 fuel moisture based on 8:00 a.m. fuel moisture and morning forecast of relative humidity for that day.

4. Plot each day on a chart: the Weather Bureau forecast relative humidity and wind; the fuel moisture and wind estimate from the forecast, tabular guides, and local knowledge; the actual measure of fuel moisture and wind.

C. Accuracy

1. Weather Bureau forecast of wind a weak point.
2. Weather Bureau forecast of relative humidity is good.
3. Our estimate compared with old system slightly better.

III. Plans for 1950

A. Experimental Weather Bureau spot forecast for a well exposed station on each of several districts.

TOPIC 17 - AERIAL DETECTION PROBLEM
(Morris-Chairman)
(Crocker-Co-Chairman)

Notes from presentation and discussion by group:

1. Emphasis is placed on using only selected trained observers. We cannot expect good results from use of the District Ranger for patrol work just because he is on that district. Proper qualification and special training and drill are essential.

2. Worthy of special note is the fact that aerial detection does not furnish a satisfactory substitute for ground detection in areas where man-caused fires are the chief problem.

3. Even with aerial detection it is believed wise to retain a skeleton system of ground lookouts in most areas.

Paper by Morris follows:

Outline of Topic Presentation
AERIAL DETECTION PROBLEMS
Morris

How far can we go from experience to date and what needs to be done to put aerial detection on a completely sound basis?

I. Experience to date

A. Dependability

1. Can see small smokes from air

a. Experience - Have first discovery on numerous fires in R-6, especially lightning fires. On the areas set up for skeleton lookout plus aerial detection the planes have found some fires in the lookout-seen area and vice versa. Estimated that planes get 80 percent on Chelan aerial detection unit.

b. Experiments - Seven out of 14 four-minute duration smoke candles discovered by aerial observers in one test. Flight elevation 3,000 ft. Observer knew the smokes would be in a given valley but did not know when. Some in open, some in timber. In another test where observer climbed to 14,000 ft. and five miles distance, as long as the smoke was in a favorable position with reference to the sun he could see smoke from smoke candles kept burning continuously on an airport.

B. Type of plane

1. Tandem or L-5 type preferred. Cub and cruiser cub have been used on Baker National Forest. Higher speed plane could be satisfactorily used.

C. Elevation

1. Sample cross sections or profiles of topography in R-1 have indicated very low rate of increase in visible area as plane climbed more than 1,500 ft. above ridges.

2. Some observers think 1,000 ft. elevation is a good average.

3. Haze layer elevation is a factor.

D. Patrol routes

1. Follow regular routes picked from survey flights to get most seen area as affected by broken topography.

2. Up and down main drainages usually best.

3. Cover known risk areas.

E. When to fly

1. In R-6 used mainly for lightning fires and go as soon as possible after storm. Advantage of early a.m. flights while smoke from some small fires may be gathered in layers or pockets. Continue flights for at least three days. Ten percent of lookout discovered fires are discovered after three days and four percent after seven days.

2. In R-6 usually mid-day patrols for man-caused fires.

3. Patrol for man-caused fires only on days with burning index above average.

F. How to look

1. Position of sun with respect to observer is a factor. Smoke visibility much increased in the direction of the sun. No effect when cloudy.

2. Color of background is a factor.

3. Shadows are a factor.

4. Rapid viewing followed by careful search is considered the best system of looking.

G. Fatigue

1. Three hours is recommended as the maximum efficient period for search. Noise and rough air decreases the efficiency of some observers.

H. Aids to vision

1. Goggles reduce eye strain.
2. Binoculars useful to study or identify smoke discovered with naked eye.

I. Selection and training of observer

1. Eyesight tests.
2. Knowledge of country, training flights.
3. Knowledge of fire.
4. Map reading and orientation training.
5. Training in visibility principles and with test smokes.

II. Needs to be done

A. Determine detection coverage objective in percent of areas seen for different values, fuel types, risks, travel time, strength of attack.

B. Determine allowable maximum size on discovery for above.

C. Determine frequency of patrol to use for given burning indexes and above factors.

D. Forests should keep record of all fires discovered and all missed by aerial patrol. The record should show the date, time, burning conditions, probable size of fire, etc. for the missed fires.

E. Determine the most economical balance of aerial and lookout detection combination.

TOPIC 18 - FIRE DANGER RATING SYSTEM
(Nelson-Chairman)
(Hayes-Co-Chairman)

Notes from presentation and group discussion:

1. Danger rating systems vary between Regions. The possibility and desirability of having a uniform service-wide system of rating danger and use of the identical factors was considered. It was the consensus that, at least at present, the time is not ripe for uniformity because of the varying importance of various factors in different regions, as influenced by different fuel and topographic conditions. It appeared that it was possible, at the current state of development, to go only so far as to establish in each Region a uniform relationship of different degrees of fire danger and uniformity in methods of making observations.

2. The chart attached-B-4 illustrates the inter-relationships between the various factors influencing fire danger and the various indexes that could be provided for use. The chart also presents a logical guide for future development and perfection of fire danger rating systems.

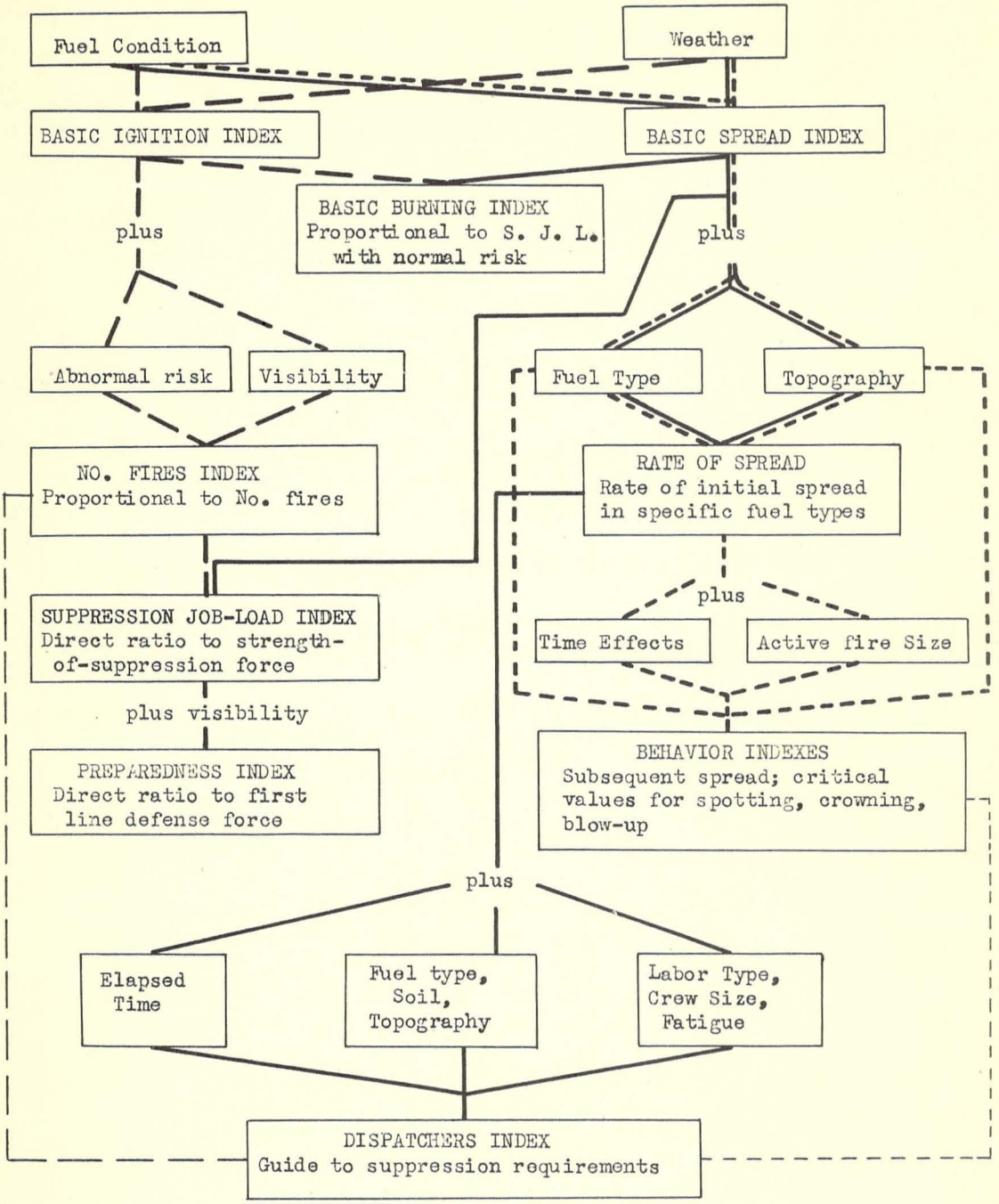
3. The provision for taking specified action to meeting different degrees / of fire danger obviously is the justification for rating fire danger.

4. A second presentation was made in connection with this topic. A new system of measuring severity of fire seasons by relating actual numbers of man-caused fires to a computed expected number of fires (or seasons rating) for 5 years was explained. While the accuracy of this new technique has not yet been fully proven, use to date indicates it will provide a useful rating of the severity of seasons and a consequent measure of the success of the prevention effort.

Further description of the system will not be attempted here since a full explanation of the system and results to date appear in the January 1950 issue of Fire Control Notes, pages 15 to 19.

B-4 Chart follows:

"Fire Danger" Indexes
G. L. Hayes - PNW Station



——— Spread guides
— — Ignition guides
- - - - Critical behavior guides
S.J.L Suppression Job Load

Fig B-4

TOPIC 19 - SAFETY IN FIRE SUPPRESSION
(Honcrief - Chairman)

Group discussion of topic

The following six premises were outlined to lead off discussion during the safety section of the meeting:

1. Our record is bad. There are a lot of inherent hazards in fire suppression work. It's not only the actual accidents we should consider, but the many near misses that have to be taken into account.

2. We can do a great deal to improve our record and the waste due to accidents.

3. The bosses' desire is the major tool we have to work with.

4. Safety attitude has got to be a part of every job we do.

5. We should know the rules and what to do.

6. There are plenty of indications that we can get safe production in fire work without interfering with production and action.

Discussion of safety and fire behavior

1. We have knowledge of a lot of red flags as to danger on fires, but we do not have at the present time any publications or codes which set up red flags for a fireman to use as guide lines. It is felt that if we codify some of the major points and take the positive point of view we can do a better job. We want to avoid the fear psychology which breaks down morale, discipline, and stymies aggressive action. Some helps in writing such a code are:

   a. Outline the known principles of fire behavior.
   b. Illustrative examples - case histories.
   c. Fire Regions to draw up standards and check lists.

2. The blow-up fire may be a small fire with a guard in charge. It was generally agreed that this code should take two forms, since a code for normal fire behavior differs materially from a code covering "blow-up" or "run-away" conditions.

   a. Simple, graphic illustrated code for foremen, strawbosses, etc.

   b. More comprehensive and complex code to cover major behavior factors for fire bosses and project leaders.

3. It was suggested that although the job of getting out the above codes was the immediate need, it would pay to follow up by visual aids.

4. Mr. Gustafson appointed the following committee to recommend the scope and form of the codes: Frank J. Jefferson, Chairman, Kermit W. Linstedt and V. A. Parker. (See its recommendations in main report).

5. Following is a list of conditions red-flagging "blow-up" potentialities which was included in a memorandum prepared by Brown and distributed by Jackson for reference of the group in discussions:

   Several generalizations that are a part of the lore of experienced fire fighters and that are authenticated by disastrous experience at various times can be repeated. A few which are not always recognized are as follows:

   a. Extremely rugged country is apt to produce erratic behavior in any fire that has gained momentum, because of the conflicting air currents that are set up.

   b. Prevailing wind direction, particularly if the wind is of low velocity, will be modified a great deal by rugged topography.

   c. The mouth of a canyon in rugged country is always affected by conflicting air currents, and any fire in its close vicinity is likely to reflect these air currents in its behavior. The head of the fire in such cases may not be the most threatening.

   d. There is always danger in placing men above a large fire and in fighting it from the head down in steep country. Wherever such strategy is necessary, lines of retreat and places of refuge become a critical part of the responsibility of the fire bosses.

e. The fire front moves much more rapidly through grass and open cover than through heavy timber, and the fire perimeter can be expected to change much more rapidly on the sectors of the fire in that kind of cover.

f. Cheat grass and dry bunch grass have extremely high rates of spread in steep country.

g. Closely related to "d" is the fact that it is always dangerous to attempt to outrun a fire up hill when there is danger of being trapped. Nearly always there are safer alternatives.

h. This danger of being asphyxiated is often overlooked in selecting places of refuge.

i. Every fire crew boss needs to have a good knowledge of fire behavior if he is to be left on his own responsibility. The alternative is close supervision and explicit safety instructions by an experienced supervising officer.

j. Special precautions are needed in assigning men to special duties where they are detached from the main crew, or will otherwise be isolated for a time from direct supervision and guidance by an experienced fire man.

6. The question of safety in placing men at heads of fire was raised - there is a need that our forces be fully cognizant that we are now getting larger groups of men located at heads of fires, on ridges, etc., in faster times as a result of more roads, helicopters, smokejumpers, etc. A neutralizing agency is the better radio communication we now have. The problem was left with the warning that all our men should be fully aware of this development and recognize the factors and set up precautions to avoid any unnecessary risks.

7. The subject of safety dangers resulting from pressures of the 10 o'clock policy in getting men into "goat rock" areas particularly as it referred to smokejumpers, was introduced. It was the general consensus that the Chief's policy allows enough latitude for good judgment and prudence to operate. The policy is so worded that we do not have to take chances with men's lives -- considerable supervisory latitude is permitted.

8. The essence of safety in firefighting includes:

a. Quality attack vs. Mass attack. Use trained and organized crews in lieu of "pick-ups".

b. Good management means good safety.

c. All safety measures are still profitable. We are not yet running into the danger of raising costs too high or interference with required action or performance.

d. Better selection will improve safety.

e. Knowledge of fire behavior will promote confidence, allay fear, boost morale, and better fire-safety.

W. O. Comments: We are glad to see the Safety Section of the Appendix close with these 5 points. They express the same philosophy as our major safety objective in 1950: ACHIEVE ACCIDENT PREVENTION THROUGH EFFICIENT MANAGEMENT, WITH EACH EMPLOYEE CONTRIBUTING HIS SHARE.